The RUBBER AGE

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Measuring Labor With a Yardstick

THE comparatively low rate of labor turnover in the rubber manufacturing industry has been often pointed out as a healthy factor, and probably the one factor which can be said to give the most stability to the industry in general. Not only is the labor in the industry stable but it has also won a just reputation for efficiency. Within recent years many efficiency schemes have been tried in industrial plants with the view always of measuring the individual effort of labor and increasing the production of the individual worker. One of the most satisfactory of these schemes and one which has now been adopted in an increasing number of the larger rubber manufacturing companies is the Bedaux plan, a description of which is made the subject of a feature article in this issue of THE RUBBER AGE.

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Late News of the Rubber Industry

Goodyear Appoints Steele Head of Gadsden Factory

FRANK A. STEELE, formerly assistant superintendent of the Goodyear Tire & Rubber Company's plant at Los Angeles, Cal., has been appointed superintendent of the company's new factory to be built at Gadsden, Ala., it was announced by officials of the company at Akron, O.

Mr. Steele has had a long record of service with the Goodyear production staff. He joined the company in 1910, at the Akron factory, his first position being in the chemical laboratory. Later he joined the production department, becoming general foreman and division superintendent, successively.

In 1919 he went to California to help establish the Goodyear coast factory and remained there, becoming division superintendent. In May, 1928, he became assistant general superintendent, which position he held when his appointment to head the southern factory production forces came. Mr. Steele is now in Akron assisting on plans for installation of equipment and machinery for the southern factory, placing orders for materials and equipment and selecting personnel.

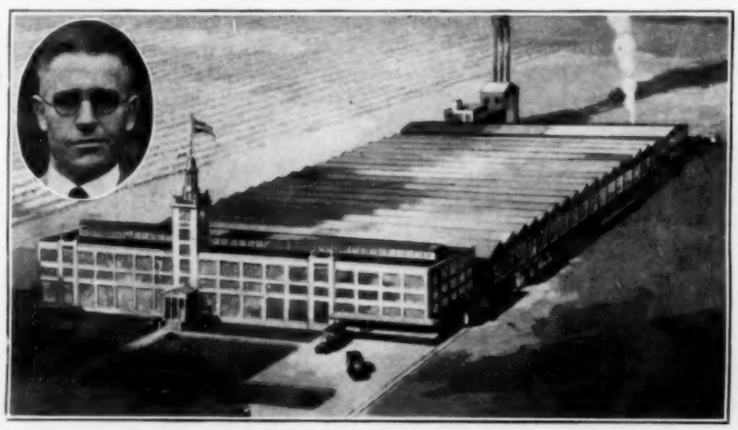
Plans for the new factory have been completed by the engineers of the Goodyear company and are now in the hands of contractors for bids. The contract is expected to be awarded and construction started in the near future. Steam shovels are already at work grading the site for the foundation.

Contracts are being let for the construction of 450 houses for the labor to be employed, and the specifications of the contract require that the dwellings be completed within three to five months. At a later date it is planned to build approximately 300 more houses for the same purpose.

The building site, which is located on the Coosa river, covers an area of 400 acres. The building itself will eventually have a frontage of 400 feet, will be 800 feet deep and four stories high. While construction work is being rushed, public officials and railroads will be busy building new highways and laying tracks to take raw materials to the plant and transport the finished product.

Fabric requirements for the new manufacturing unit will be supplied from the company's mills at Cedartown, Ga., about 50 miles distant. Construction of the plant and installation of machinery is expected to be completed by mid-summer, when the plant will go into operation. It will have an initial capacity of 5,000 tires a day and will employ 1,800 people.

The Goodyear company's investment in Gadsden will approximate $7,000,000.



Architect's Drawing of the Proposed Plant of the Goodyear Tire & Rubber Company at Gadsden, Ala. (Insert) Frank A. Steele.

National Tire & Rubber Reorganization Planned

THAT a complete reorganization of the National Tire & Rubber Company, East Palestine, O., is about to be undertaken by an advisory committee of the larger creditors, headed by Charles Seligson, of the National Surety Company, was announced January 5. The aim of the committee is a liquidation of the total current liabilities of approximately $200,000. The full total of liabilities are figured at $742,680, including the preferred stock issue of $246,800, the common stock issue of $276,195, and the reserve of $21,285.

Figures of the condition of the business as of November 30, 1928, submitted by the company at a meeting of the larger creditors held in the offices of the Rubber Trade Association of New York, indicate a solvent condition, it was declared. The financial reports, as obtained by the comptroller of the company, showed total current assets of approximately $249,000, which together with the permanent assets of $359,679, patents, trademarks, etc., valued at $50,714, and prepaid insurance, etc., of $82,837, makes up a total figure of $742,680.

Creditors were to receive a letter from Melville Boyd of the Affiliated Merchants' Protective Group, Inc., secretary of the committee, representing Wellington, Sears & Co., advising that everything possible has been done to protect the interests of all claims, and stating that a further report will be made just as soon as Ernst & Ernst, accountants, have verified

the figures submitted by the company and made an independent audit for the committee. Instructions have been issued to have all funds deposited in a Youngstown bank and checks drawn thereon to be countersigned by a representative of Ernst & Ernst.

L. M. Kyes, secretary and counsel to the company, has been directed to obtain the majority of the voting stock endorsed in blank, and the resignation of all the officers and directors of the corporation, all of which is to be held in escrow by the chairman of the committee, pending outcome of present negotiations for a reorganization of the business, which has been in operation for about ten years.

F. B. Davis, du Pont Executive, Chosen to Head U. S. Rubber

AT A MEETING of the Board of Directors of the United States Rubber Company held Tuesday afternoon, January 15th, Mr. Francis Breese Davis, Jr., was elected a Director, Member of the Executive Committee, Chairman of the Board of Directors and President of the United States Rubber Company. At the same meeting, the Board accepted the resignation of Mr. Charles Bronson Seger as Chairman of the Board of Directors and President of the Company. Mr. Seger will continue as a Member of the Board of Directors and Executive Committee.

F. B. DAVIS

Mr. Davis is a Director of E. I. du Pont deNemours & Company, and president and general manager of the Du Pont Viscoloid Company. He has had a business career embracing a wide range of activities in diversified fields of endeavor. He was born September 16, 1883. He was graduated from Yale University in 1906 with a degree of civil engineer and spent the next year in engineering work in New England, later joining the Pennsylvania Railroad's Maintenance of Way and Construction Departments. In 1909 he first became associated with the du Pont Company and was detailed as resident engineer in charge of plant construction on the Belin plant in Pennsylvania, and was soon put in charge of the company's black powder construction division.

A new line of work requiring unique sales ability was his next step. He became general manager and vice president of the Du Pont Chemical Company, to which was assigned the work of disposing of the company's excess and now un-needed materials and plants, the usefulness of which to the company was ended when the Armistice was signed. On May 1, 1925, the consolidation of the Pyralin department with the Viscoloid Company of Leominster, Massachusetts, was consummated, and Mr. Davis became president of the Du Pont Viscoloid Company, which was organized to take over the consolidation.

Miller Rubber Conducts Sundries Sales Meeting

MERCHANDISING plans for the present year were discussed at the annual sundries sales conference conducted by the Miller Rubber Company at the Akron plant and offices from January 2 to 4. Salesmen and branch managers from all sections of the country attended, and a delegation from New York City arrived in Akron by airplane.

It was reported by officials that 1928 had been one of the best years in sundries sales in the company's history. The firm has manufactured sundries for thirty-seven years. W. F. Davison, manager of sundry sales, was in charge of the conference, and talks were made by William F. Pfeiffer, general manager; L. C. Rockhill, general sales manager; R. T. Griffiths, superintendent, and by several department managers.

Prospects for 1929 were said to be excellent with the possibility of establishing new sales records. The representatives were conducted on an inspection tour through the factory of the company, and the conference closed with a dinner at Young's Hotel on the night of January 4.

Those who flew to the meeting from New York were N. B. Quick, New York sundries branch manager; G. N. Heinemann, president, and Miss Hazel H. Adler, secretary of the Taylor System, Inc., New York. The Taylor system of color harmony is employed by the Miller company in the manufacture of bathing caps and other rubber goods.

New Mansfield Plant To Double Capacity

CONTINUING the steady progress begun during the period following the late war, the Mansfield Tire & Rubber Company, Mansfield, O., has outgrown its present facilities, and construction work on an addition to its plant was started last month. The new wing, which is to be six stories in height, will provide the company with space that is expected to increase the output of Mansfield tires approximately 80 per cent, when it is completed in May or June.

The present manufacturing output of 5,500 to 6,000 tires a day will be stepped up to about 10,000, President George W. Stephens predicted. "If the business continues to show the progress that present conditions indicate," Mr. Stephens also said, "we very likely will not stop with the present expansion program for 1929."

The Mansfield Tire & Rubber Company came into existence during the year 1912 on a small scale. Following the war, it began to grow and the reconstruction period of 1919 and 1920 brought prosperity to the company. "The success of the company is due first of all to the building of a product that has been satisfactory from a quality standpoint," Mr. Stephens says. "A distribution and sales plan that was original with the company played a great part in its success."

The product is distributed through hardware wholesalers, and with the connections made in all cities and large towns, practically every population centre in the country is covered by distributors, according to Mr. Stephens.

Several other improvements are being made by the management of the plant, including additions to the machinery in the present factory and the power plant. The new building, when completed, will provide a floor space of approximately 150,000 square feet for factory facilities only. Offices for the organization will be maintained in the present structure.

Raritan is Merged With Lambert Tire & Rubber

CONSOLIDATION of the Lambert Tire & Rubber Company, Akron, O., and Raritan Rubber, Inc., New Brunswick, N. J., was announced January 8 by officials of the former company, together with plans for a complete reorganization program. The manufacturing activities of Raritan Rubber, Inc., which has been making solid and cushion tires exclusively, are to be transferred to the Lambert plant at Barberton, O., and the New Brunswick factory will be closed down.

The capital structure of the Lambert Tire & Rubber

Company has been reorganized to care for the consolidation. The common capital stock of the company has been increased to the extent of $200,000 and the preferred stock to the extent of $128,000. The new capital structure will materially strengthen the financial resources of the company and enable it to expand both manufacturing and sales activities.

As a final step in carrying out the consolidation and reorganization, a committee filed a petition on January 8 in common pleas court, asking for the appointment of a receiver to wind up the affairs of the Lambert Tire & Rubber Company, an Arizona corporation, which is the present owner of the property. The action involves what is termed a friendly receivership, and J. W. Dessecker has been appointed receiver. The Lambert company was established in 1913 and, until the recent increase, has had a capital of $5,000,000. Raritan Rubber, Inc., was formed in 1926 with $200,000.

The officers of the Lambert Tire & Rubber Company are G. W. Seiberling, president; J. P. Seiberling, vice-president; J. W. Dessecker, secretary and treasurer; G. W. Seiberling, J. P. Seiberling, G. W. Merz, William A. Boesche and J. W. Coyle, directors. J. P. Seiberling, who is in charge of sales, has announced that Alfred Foster, president of Raritan Rubber, Inc., is coming with the new organization in the capacity of manager of truck tire sales.

A new solid and giant cushion line of tires will be manufactured by the consolidated company under the name of Lambert-Raritan, and is expected to bring to the company a sales volume of $500,000 a year, at the same time rounding out the line of tires at present manufactured by Lambert. The full line will include the Lambert duo-tread, regular balloon, high pressure cord, giant truck cord, and Lambert Trublpruf cushion tires.

British Goodrich is Increasing Revenues

COMPLETE recovery from the poor results shown during 1927 was revealed by the statement of the British Goodrich Rubber Company, the English subsidiary of the B. F. Goodrich Company, of Akron, O., for the year ended September 30, 1928. Net profits for the firm are shown to have risen from £5,856 to £73,235, or approximately from $28,450 to more than $350,000.

The results for the fourth year of the company bear out the statement made in the previous year's report that the outlook for 1928 seemed very encouraging. After deducting the debit balance of £1,206 brought forward, there still remains at the disposal of the company a sum of £72,029. Preference dividends absorb £15,000, and in addition £10,897 has been transferred to the preference shareholders' reserve, leaving £46,132.

The board of directors has decided to employ the bulk of this amount in strengthening the balance sheet. A sum of £1,829 has been appropriated to writing off the discount of the debentures which have been issued, and £27,315 to writing off the item of commission on shares and debentures, while the preliminary and formation expenses are written down from £42,255 to £35,000. The remaining balance of £9,734 is to be carried forward as compared with the debit that was carried forward in the year previous.

The report, however, draws attention to the fact that "renewed and intensified competition introduces once again an element of uncertainty." The totals in the balance sheet of both the stock and the sums due on bills receivable, etc., are larger than a year ago, the former having risen from £423,000 to £439,000 and the latter from £281,000 to £314,000. The amount due on current account to the International B. F. Goodrich Corporation has fallen from £402,000 to £374,000, the amount due by the company on bills payable and to trade creditors, etc., having risen from £115,000 to £131,000.

No dividend has as yet been declared on the ordinary capital or common stock of £649,359. These shares were selling last month on the London market at 8s. 9d., while the preference shares were quoted at 16s 6d.

Hammond is Sales Manager of Dunlop Tire & Rubber

THE Dunlop Tire & Rubber Company has announced the appointment of Girard Hammond as general sales manager of the company. Mr. Hammond recently resigned from Batten, Barton, Durstine & Osborn, advertising agency of Buffalo, N. Y., where he was the executive in charge of the Dunlop account which the agency has handled for some time. Having acted as advertising and sales counsel for Dunlop in the past, Mr. Hammond finds himself already familiar with the direct sales work he is now undertaking.

GIRARD HAMMOND

Mr. Hammond succeeds E. H. Kidder, who resigned the sales managership of Dunlop some time time ago. In the interim Dunlop sales have been handled by E. B. Germain, president of the company, and two assistant sales managers.

Mr. Hammond, a graduate of Cornell University, became the leader of more than 200 salesmen at the age of 26, when he was appointed sales manager of the Dairymen's League of New York State. His experience has also included executive work in newspaper publishing and in magazine publishing.

Lee Rubber & Tire Corporation Shows Profit of $165,764

THE Lee Rubber & Tire Corporation has reported for the year ended October 31, 1928, net profit of $165,764 after depreciation, interest and other charges, equal to 55 cents a share on the 300,000 shares of no-par stock. In the previous year, the company's report covered the ten months ended October 31, 1927, and showed net profit of $784,257, including $160,003 profit from sale of securities of non-affiliated companies, equal to $2.67 a share on 293,261 shares of stock. Excluding this profit from the sale of securities, the net profit was $624,254, or $2.13 a share. In 1926 there was a deficit of $1,670,068.

After reviewing the decline in crude rubber prices last year and the subsequent reductions in the selling price of tires by manufacturers, which caused such heavy losses, John J. Watson, president of the company, decries this practice.

"It is a sad commentary on the policies pursued by companies engaged in tire manufacture that they have followed a policy which has made their profits relatively small in most cases and with substantial losses in others, and shows, when we consider the great expansion of the automobile industry and the large profits made in that industry and the fact that not a car could run without the use of rubber tires, that the tire business has not been conducted so as to

result in making the profits to which it is entitled considering its great importance to the automotive industry.

"Our volume of unit sales has increased during the year, and we have met with an increasing demand for all of our products. The demand for Lee DeLuxe tires, Lee Staghound solid tires and for Republic mechanical goods is most gratifying and shows promise for a continuously increasing business."

The consolidated income account for the year ended October 31, 1928, compares with the two previous reports as follows:

	Year end Oct. 31, '28	10 mos. end Oct. 31, '27	Year end Dec. 31, '26
Net sales	$11,032,914	$10,175,169	$12,213,076
Expenses, depreciation, etc.	10,845,805	9,517,307	13,192,629
Operating profits	$187,109	$657,862	*$979,553
Other income	111,249	†226,778	72,132
Total income	$298,358	$884,640	*$907,421
Interest	132,594	100,383	117,248
Inv. adj.			645,399
Net profit	$165,764	$784,257	*$1,670,068

*Loss. †Includes $160,003 profit for sale of securities of non-affiliated companies.

Samson Tire & Rubber Has Record Volume of Sales

SALES of the Samson Tire & Rubber Corporation, Los Angeles, Cal., totaled $7,605,410.55 for the eleven months ended November 30 last, a new record for volume in the history of the company, which compares with $6,588,075.88 for the entire year of 1927. It is understood that there has been a much larger increase of unit sales

Administration Building of the New Samson Factory at Los Angeles

which is not reflected accurately in the volume figures because of price reductions.

Net earnings for the eleven months, after an inventory write-off of 156,406.81, totaled $225,425.26 as compared with $424,716.16 for 1927. Earnings for the five months ended November 30 were at the annual rate of $540,487.10, equal to approximately 8.31 times maximum annual interest charges on debentures to be presently outstanding.

A group consisting of George H. Burr, Conrad & Broom, Inc., Hunter, Dulin & Co., and Banks, Huntley & Co., is offering at par $1,000,000 Samson Tire & Rubber Corporation 6½ per cent convertible debentures, which will be used in part to furnish additional working capital and to finance the new $8,000,000 factory at Los Angeles recently announced. This is the first funded debt of the company, it was stated.

Under the refinancing plan, the par value of the common stock has been raised from $5 to $10, and 100,000 shares issued to stockholders in place of the 200,000 shares of the old stock. Approximately 25,000 additional shares of stock will be offered by the syndicate. Application will be made to list the issue on the Los Angeles Curb Exchange.

Star Rubber Company is Reincorporated With New Officers

THE Star Rubber Company of Akron, O., which went into receivership several months ago, has been reincorporated with a capital of 250 shares of no par value, according to recent announcement in the Akron press. The old company was one of the pioneers in the industry. Since the receivership action the company has been closing all accounts and is said to have sold practically all the machinery and equipment of the plant.

The new company will confine its activities to a jobbing business, according to reports, and will not enter the manufacturing field except in a small way. No definite announcement has been made, however, other than that the company will be managed by an entirely new regime.

Experiments Show Rubber Yielding Plants Thrive in Florida

EXPERIMENTAL plantings of several different kinds of tropical rubber plants in Florida are demonstrating more conclusively than ever, according to investigators in the United States Department of Agriculture, that rubber-yielding trees and vines are able to survive and flourish under Florida conditions. At present, however, the department is not ready to make predictions as to the possibilities of commercial rubber-planting in Florida.

Last winter was considered the most severe in forty years in the vicinity of Miami, according to O. F. Cook of the Bureau of Plant Industry, who is in charge of the experiments. This afforded a good test of reactions to cold weather. Many small plants were killed, but those of larger growth and in good condition were not injured in most cases. Some were cut back by frost, but recovered promptly and made vigorous growth through the summer. All the principal types of rubber trees, including those used for planting in tropical Asia, Africa, and South America, are represented by thriving plants in the Florida experiments.

The Chapman Field plantings are near the coast, and it was evident that the strong sea breeze retarded the growth of the young trees, and that protection was necessary. "When this was supplied," said Mr. Cook, "the plants responded with vigorous growth, apparently as normal and as rapid as in the tropics. Even the Hevea or Para rubber tree of Brazil is showing ability to thrive there. The seedlings and young trees that have had protection from the wind at Chapman Field have grown as well or better than in plantings under tropical conditions in Haiti and Panama. It is probable that normal Hevea trees may grow to maturity in many areas of southern Florida.

"It is still too early to form an opinion regarding the feasibility of growing rubber in Florida, but, we must lay aside the current belief that the Hevea tree is very delicate. and hence must be confined to a narrow equatorial belt of the tropics. A single Hevea tree has lived for more than 20 years in Florida, at Palm Beach, under conditions much less favorable than occur elsewhere. Castilla rubber trees from Central America, which apparently are more tender than Hevea, grew for 12 years on the south shore of Lake Okeechobee and attained a height of 40 feet, but were destroyed in the hurricane of 1926."

The public will be informed, the department promises, as soon as the supplies of seed or propagating material are sufficient for more general experimental or ornamental planting.

*M*easuring *L*abor in the *R*ubber *I*ndustry

The Bedaux System Scientifically Measures the Efforts of Each Worker in Terms of a Common Unit Applicable to Each Operation in the Factory—Scheme is Being Adopted in Many of the Rubber Companies—Aids in Placing the Right Man in the Right Job.

IT IS a significant fact that progress in the rubber industry as seen in the results of chemical research, improved machinery, and more efficient distribution, is being extended to the control of labor, its measurement and remuneration. Outstanding among improved methods of labor measurement and payment is the installation of the Bedaux system in many of the most progressive rubber mills. The Hood, Ajax, Pennsylvania, Converse, Goodrich, and United States companies are among those who are operating all or part of their mills under this system.

Bedaux measurement of labor is based on the principle that all human effort may be measured in terms of a common unit, that unit being made up of a combination of work and rest, with the proportions dependent upon the nature of the effort and the subsequent relaxation required to compensate for it. As tasks vary, the ratio of work to rest within the unit varies, but the unit itself remains constant. In taking a time study for a piece rate, a similar measurement of operation must be taken into consideration with the exception that the Bedaux unit is a result of years of study whereas a factor used in setting an ordinary piece rate by a rate setter or foreman in the majority of cases is not.

The Bedaux Unit of Work

The Bedaux unit takes its name from its originator, Charles E. Bedaux, and is called a B. In general terms, the B may be described as the amount of work a normal operator would do in one minute when working at a normal rate of speed under ordinary conditions, and availing himself of his full measure of relaxation. Thus, if it takes this normal man 10 mintes to build a tire, the unit of measure for the operation is 10 B's, or if it takes a heel trimmer 15 seconds to trim a men's half heel, the unit of measure is .25 B's.

In 1911 Mr. Bedaux became impressed with the need of a means of measurement that would render it possible to set quantitative values on human physical effort. Successive theories were tested and rejected until the correct basis was found in the relation of bodily strain to effort under any given set of conditions. The following five years were devoted to building up relaxation values applicable to the expenditure of effort under varied conditions. Careful study was made of the handling of different weights in varied positions, using different members of the body, particularly in conjunction with the relative sequence of motions and the frequency of their repetition. Then Mr, Bedaux established his unit, a combination of work and rest, which is defined as follows:

"The Bedaux Unit or B, is a fraction of a minute of work plus a fraction of a minute of rest, always aggregating unity, but varying in proportions according to the nature of the strain."

B Values Established for Each Operation

In the application of the Bedaux system, the first step is to establish B values for each operation in the plant. This is done by time study, using the Bedaux formula for fatigue. It will be noted that Bedaux does not concern itself with methods of operation, leaving that entirely to the organization itself who are better qualified to work out methods for their own industry. In having B values established, the plant gains the advantage of having all operations restudied at one time and on the same basis. Most factories with piece work systems are like Topsy, "they just growed." Some rates are high, others are low. Once the B values are set, the next step is to establish class wages for different operations. This is done by management and is based on the labor market in the particular section where the mill is located. But this in no way affects the wages of the worker as under the Bedaux system the worker is guaranteed the hourly wage of his class and earns a premium for extra effort.

Comparison of actual output with measured capacity to produce discloses misdirected or unutilized efforts that cause losses. Under Bedaux measurement, the average number of Bedaux units, or B's per hour, is a direct measure of effective effort. It has been found that under Bedaux incentives and control, 80 to 85 B's per hour may be expected instead of the normal 60 B's or 60 minutes of work per hour. Less than 80 B's an hour indicates incomplete use of labor and incomplete realization of maximum earning power. The worker is not penalized for things beyond his control such as additional work made necessary by defective material or a machine out of order, lost time waiting for assignment, etc.

Let us take a practical example to show how the system operates. Supposing the B value on running a 50 yd. roll of tube stock for a calender man is 10, which means that 10 minutes is the time the normal or average operater would take to run one roll. It might be argued that if the speed of the calender is fixed for a certain type of stock he could not be expected to produce more than one roll in ten minutes. But there are variables nevertheless. For

example, in this instance, the time of changing rolls. And in setting B values under Bedaux with the fatigue allowance it is always possible for the better than average operator to shorten the time and make a B hour of at least 80, meaning that he has done 80 minutes of work in 60. The normal man, would, therefore, produce in an eight hour day, 6 rolls of stock per hour, or 48 rolls per day. Forty-eight rolls multiplied by 10 the B value equals 480 B's, divided by 8, the hours worked, equals 60 B hour.

How is this translated into terms of pay? The man is paid by the hour, at the prevailing wage for his skill—say 75 cents per hour for a calender man. For working a normal or 60 B hours, he is paid his normal wages of 75 cents per hour or $6 per day. But this particular man is skilled and fast and produces a roll of stock every eight minutes or 8½ rolls per hour or 68 per day. His production of 68 is multiplied by the B value, 10, giving 680 B's values, divided by 8, making an 85 B hour instead of 60. Deducting the standard or 480 B's, for which he receives his normal wage, we have 200 premium B's for which he is paid a bonus under the Bedaux plan as follows:

8 hours at 75 cents	$6.00
3⅓ hours premium (200 divided by 60) @ 75c. = $2.4975 of which he receives three-fourths, the balance going to supervision and clerical, making the premium	1.87
Total pay for 8 hours	$7.87

In other words, he earns his $6 a day and a premium of $1.87 for work better than standard. The premium is paid in a separate envelope.

The question inevitably arises, why not give the worker the entire pay for his extra effort? Because recognition is made of the other factors which contributed to his success. In order for the calender man to run a roll in eight minutes instead of ten, the stock had to be mixed correctly, milled properly, and had to be delivered on time. This is accomplished by supervision and indirect labor which also should be rewarded. To maintain the necessary records for the system, the daily posting sheets showing B hours, etc., extra clerical workers are required for which provision must be made out of the savings made possible by the system.

It is claimed that the Bedaux method is fairer to the worker than piece work in that it provides that all idle and breakdown time shall be paid for. Suppose there is trouble with the electric power and the calender man has to wait, or the mixing schedule is wrong and they do not mix enough stock for his run. This time is not charged against his production. For example, the time sheet on the same operation of running a calender might read as follows:

	Productive	*Idle Time*	*Breakdown*
	8–8:30	8:30–9	.....
	9–10:30		10:30–11
	11–12		
	1–5		
Total hours	7	.5	.5

Thus through no fault of his, he is able to run only 53 rolls of stock. His pay schedule is then made up as follows:

Production 53 x 10 (B value) =	530 productive B's
Idle 60 B's =	60
Total	590
Standard 480 (8 x 60)	480
Premium B's	110
Premium	$1.03
Eight hours at 75c	6.00
	7.03

Thus, in this instance, the operator earns less pay than if he had been permitted to produce at an 85 B hour rate for the entire eight hours. This in itself is one of the best features of Bedaux. The writer has seen Bedaux workers held up because a belt came off a machine, climb up and put it on themselves, rather than wait for a mechanic; and a foreman rushing stock to a pressman himself so that he would not lose a heat by waiting and thus lose his premium. There is no incentive to prolong the waiting time under Bedaux; just the reverse. Yet it is much fairer to the worker than piece work under these conditions as he receives his hourly rate just the same. Also, the pay is in proportion to the actual effort set forth. If a machine restricts a man in the effort he can put forth, he clamors for improvements and rearrangements to remove the restriction or give him additional work.

As soon as Bedaux has been applied to one department or group of workers, a daily posting sheet shows for each individual the number of B's produced the preceding day, the resulting B-hour, and the amount of premium earned. This sheet appeals to the worker's pride. He sees himself of enough importance for his individual performance to be recorded daily. He watches the performance of others and enters into friendly competition with his fellow workers. The worker takes a new interest in his daily routine. His record speaks for itself as compared with that of a less competent neighbor, and he has opportunity to prove his fitness for promotion. In times of low production and layoff, the better workmen are obtained.

Helps in Effecting Cost Control

One of the salient points about the Bedaux system is that it is more than a method of labor measurement and payment of wages. It shows definitely and clearly the exact extent to which the labor, individually or in groups, is utilized. It must be obvious from the above description that it provides for decreased unit cost with increased production. It also furnishes a very effective cost control. In addition to the plant posting sheet, each department head receives a consolidated sheet or analysis form, showing the performance of each operator and the average B hour of the department. Lost time due to breakdowns and other causes is shown separately, which tends to keep these leaks constantly before management to enforce correction and improvement.

It will be recalled that if an operator produces less than 60 B's per hour he is not penalized. Here is where the premium for supervision enters the picture. If a foreman is paid premium on the B hour of his department and that B hour is lowered because he has several unfit or soldiering workers, his natural incentive is to replace them with workers who can earn premium. Except in the case where a large number of apprentices are taken on to increase production, workers who produce less than 60 B's are not kept on the payroll very long.

The measurement of supervision for a department is made up as follows: the standard productive cost per B, and the standard non-productive cost per B (this is obtained by observation of helpers and general workers not on premium) and the actual non-productive cost per B are determined. The two productive costs (standard and actual) and the two non-productive costs are added in each case to give the total standard cost per B, and the total actual cost per B for the department.

The department B hour, obtained by subtracting from the operator B hour the units allowed for causes beyond the control of the operator, permits a comparison between actual accomplishment and possible accomplishment and gives the true measure of supervision when cost is taken into consideration. The measurement of supervision expressed in percentage, or as a ratio of standard to actual,

(*Continued on page* 441)

Rubber Exhibits of Interest at 29th National Automobile Show

F. G. Schenuit Rubber Company Is Only Tire Exhibitor, But Displays of Rubber Shock Absorbers, Rubber Steering Wheels, Rubber Paint and Other Accessories Feature the Show

THE 29th annual National Automobile Show opened at the Grand Central Palace, New York City, on January 5 and continued until January 12 with tremendous crowds in attendance on every day. Although the leading tire and rubber manufacturers were not represented by exhibits, in accordance with the policy of the Rubber Association of America, Inc., there was much of interest to the industry at the show. Balloon tires were universal among the cars shown, and several were equipped with two spare tires as original equipment.

The only tire manufacturer exhibiting was the F. G. Schenuit Rubber Company, Baltimore, Md., which showed the full line of balloon and high pressure casings which it sells direct to large commercial fleet operators. These tires are featured by their "double-grip non-skid" diamond-shaped vacuum cup tread and by their "air-cooled" sidewalls.

The John Warren Watson Company, Philadelphia, Pa., featured its new Rubber Flow Stabilator in its exhibit. This device derives its name from the inclusion of a specially devised rubber compound which flows over polished steel surfaces built into the mechanics of the new Stabilators. Employing no liquids, this new principle is said to preclude all possibilities of leaking and necessity for refilling, of worn valves and packing, and of loss of efficiency due to aerating, frothing and temperature variations. The new resistance medium is neither dry friction nor fluid friction, but is in the nature of a semi-fluid or hard plastic.

A Schrader's Son, Inc., Brooklyn, N. Y., had a large exhibit of tire valves and tire gauges, and there were other displays of tire gauges by the Moto Meter Company, Long Island City, N. Y., and by the Acme Gauge & Instrument Company, Brooklyn, N. Y. There were several exhibitors of rubberized topping materials, and displays of rubber insulated battery cables were shown by the Packard Electric Company, the Okonite Company and the Whitaker Battery & Supply Company. The Cincinnati Enamel & Varnish Company, Cincinnati, O., had a large display of its Rubbernamel car paints, said to contain a large quantity of pure Para rubber, and there were numerous exhibits of tire repair shop equipment and vulcanizing apparatus.

One of the most attractive exhibits in the accessory group was prepared by the American Hard Rubber Company, Akron, O., for the display of its Husted steering wheel. The Husted steel core steering wheel in the year since its introduction has become standard equipment on 15 makes of cars, representing more than a third of the industry's output. Studebaker, Pierce-Arrow, Packard, Nash, Chrysler ("65" and "75"), DeSoto, Willys-Knight, Graham-Paige and Jordan are among the makes using the Husted wheel for one hundred per cent of their production.

Like many other automotive advancements, the steel core safety wheel is a development of the speedway. Some years ago when H. A. Husted of the American Hard Rubber Co. was manager of a dirt track racing team on the County Fair Circuit, one of his drivers lost control of his car and crashed through the fence. The crash was due to steering wheel failure. The driver in rounding a turn put too much strain on the wheel which had broken in his hands and left him without control of the car.

Husted went to work to develop a wheel which would make impossible [illegible] tion of this cause for accident, and

built a clumsy, laminated wheel of wood and steel which would resist the most severe stresses. Successive improvements were made.

A brief outline of its construction reveals the tremendous strength of the Husted wheel. The first step in construction of the wheel is the stamping out of a large sheet metal disc. A second operation cuts four sections from the disc, leaving a rim, four spokes and a centerdisc. The third operation perforates the outer rim with small holes about an inch apart, extending all around its circumference. The spokes are perforated in the same way. The center of the center disc is then stamped out and the flat skeleton fed into a press where rim and spokes are shaped in such

Display of Tires of the Schenuit Rubber Company

American Hard Rubber Company Booth Featuring the Husted Wheel

a way as to vastly increase the rigidity of the spider. An auxiliary rim is then spot welded over the center portion of the spider to give it greater strength and rigidity around the bearing or hub. The whole skeleton is encased in "Ace" hard rubber under great pressure.

No Husted wheel has ever been known to break in use. Its graceful appearance is an advantage which can be ranked with the safety value. Another important feature is the fact that color on the rim is fast.

Woman Makes Tires for 6-Day Racers

PRACTICALLY all the tires used by American riders in the annual six-day bicycle races held around New York City are made by a woman, Mrs. Ernest Pye, whose sole livelihood depends on this manufacuring enterprise. Mrs. Pye took over the business of making these special tires when her husband, a bicycle rider of some renown twenty years ago, died.

1928 Rim Output Gains 21 Per Cent

PRODUCTION of automobile and other rims during the year 1928 showed an increase of more than 21 per cent over the figures for 1927, the grand totals being 24,247,282 for the year just concluded as against 20,012,055 for the previous twelve months. There was the usual season decline in December's figures of the number of rims reported as inspected and approved by the Tire & Rim Association of America, Inc., the total actually falling below that for December, 1927. In addition to the standard sizes shown in the following table, there were produced 358 experimental rims of a 40x10.50 size.

Rim Size	Dec., 1928 No.	%	12 Mos. 1928 No.	%
Motorcycle				
28x2½	——	—	——	—
24x3 CC	2750	0.2	23177	0.1
24x3 Std.	——	—	20046	0.1
26x3 CC	927	0.1	3783	0.0
26x3 Std.	250	0.0	48302	0.2
28x3 CC	——	—	452	0.0
28x3 Std.	——	—	301	0.0
Total	3927	0.4	96061	0.4
Clincher				
30x3½	17905	1.6	771489	3.2
31x4	——	—	4386	0.0
Total	17905	1.6	775875	3.2
18" Balloon				
18x3½	——	—	9362	0.0
18x4	37469	3.4	1187890	4.9
18x3.25	——	—	148278	0.6
18x4½	18158	1.6	172529	0.7
18x5	2484	0.2	12686	0.1
18x6	14	0.0	14	0.0
Total	58125	5.3	1530759	6.3
19" Balloon				
19x2.75	6126	0.6	208017	0.9
19x3½	23057	2.1	1664059	6.9
19x4	165000	15.0	2845986	11.7
19.3.25	6891	0.6	52695	0.2
19x4½	28426	2.6	917444	3.8
19x5	14052	1.3	95528	0.4
19x6	15	0.0	15	0.0
Total	243567	22.1	5783744	23.9
20" Balloon				
20x2.75	240028	21.8	709501	2.9
20x3½	3170	0.3	402058	1.7
20x4	135871	12.3	3266779	13.7
20x4½	46367	4.2	681473	2.4
20x5	25510	2.2	716939	3.0
20x6	4717	0.4	115865	0.5
Total	445663	41.4	5892615	24.2
21" Balloon				
21x2.75	16864	1.5	4740946	19.6
21x3½	37063	3.4	977026	4.0
21x4	5962	0.5	530703	2.2
21x4½	4937	0.4	297251	1.2
21x5	318	0.0	12439	0.1
21x6	——	—	7633	0.0
Total	65144	5.9	6565998	27.1
22" Balloon				
22x3½	——	—	1775	0.0
22x4	——	—	4118	0.0
22x4½	——	—	4826	0.0
Total	——	—	10719	0.0

Rim Size	Dec., 1928 No.	%	12 Mos. 1928 No.	%
High Pressure				
30x3½-23	3548	0.3	117205	0.5
31x4 -23	——	—	640	0.0
32x4½-23	6742	0.6	109578	0.5
32x4 -24	3055	0.3	95153	0.4
33x4½-24	——	—	2613	0.0
32x3½-25	——	—	155	0.0
33x4 -25	——	—	3403	0.0
34x4½-25	874	0.0	10567	0.0
Total	14219	1.3	339314	1.4
20" Truck				
30x5	181978	16.4	2380846	9.8
32x6	24132	2.2	463438	1.9
34x7	12177	1.1	136705	0.6
36x8	9656	0.9	85460	0.4
40x10	306	0.0	4547	0.0
Total	228249	20.7	3070996	12.7
22" Truck				
36x7	400	0.0	10199	0.0
38x8	556	0.1	2080	0.0
Total	956	0.1	12279	0.1
24" Truck				
34x5	2413	0.2	18359	0.1
36x6	2687	0.2	41543	0.2
38x7	2552	0.2	54145	0.2
40x8	3985	0.4	35387	0.1
44x10	309	0.0	1105	0.0
Total	11946	1.1	150539	0.6
Airplane				
8x3 SS	——	—	101	0.0
12x3 SS	45	0.0	397	0.0
18x3 SS	——	—	495	0.0
20x3 SS	——	—	6	0.0
20x3½ SS	163	0.0	1786	0.0
20x4 SS	——	—	1171	0.0
21x4 SS	——	—	21	0.0
20x5 SS	——	—	98	0.0
20x6 SS	1284	0.1	4093	0.0
20x8 SS	——	—	331	0.0
24x10 SS	——	—	111	0.0
18x4 Cl.	——	—	9773	0.0
Total	1492	0.1	18383	0.1
GRAND TOTAL	1,101,193		24,247,282	

Balloon Stocks Gain in November

STOCKS of balloon casings in the hands of manufacturers at the end of November showed an increase of more than 61 per cent over the figures for the same time in 1927, the number being 8,256,741 casings as against only 5,197,309 for November 30, 1927. Due to seasonal curtailments, production was less than for any month since January, 1928, and shipments of casings the lowest for the year.

The figures for November, as released by the Rubber Association of America, Inc., represent 75 per cent of the total industry in the United States and have been brought up to represent 100 per cent in the following table:

TIRE AND TUBE PRODUCTION
(All Figures Represent Thousands)

	October, 1928			November, 1928		
	Prod.	Ship.	Inven.	Prod.	Ship.	Inven.
Pneumatic Casings:						
All types	7,326	5,717	11,520	6,075	4,998	12,579
Balloon	4,591	3,557	7,690	3,834	3,240	8,257
High Pressure Cord	2,715	2,128	3,779	2,219	1,740	4,263
High Pressure Fabric	21	31	52	22	18	59
Solid and Cushion Tires	62	60	204	48	50	201
Inner Tubes:						
All types	6,929	5,662	15,285	5,592	5,002	15,743
Balloon	3,637	3,153	9,252	3,025	2,984	9,156
High Pressure	3,292	2,509	6,033	2,572	2,017	6,604

Boston Group of Rubber Division Holds Symposium

Over Two Hundred Members Attend Afternoon and Evening Sessions—From the Standpoint of Attendance and Enthusiastic Discussions on Various Papers Read the Meeting is Considered Most Successful Held by Boston Group

MORE than two hundred rubber chemists, superintendents, technologists, and not a few presidents and vice-presidents of large Eastern companies attended the rubber symposium at a joint meeting of the Northeastern Section and the Boston Group of the Rubber Division, A. C. S., held at the University Club, Boston, on the afternoon and evening of January 12.

Both from the viewpoint of the attendance, enthusiasm, good fellowship, and interest created by the excellent papers and discussion presented, it was by far the most successful meeting ever held in Boston.

Starting with the afternoon session, John M. Bierer of the Boston Woven Hose and Rubber Company, permanent chairman, introduced the speakers, the first paper being presented by Dr. A. A. Somerville of the R. T. Vanderbilt Company, on "Some New Laboratory Work on Rubber Compounding." Dr. Somerville's paper covered the use of selenium in carcass and friction stocks and showed samples of some interesting results gained thereby. His paper was followed by a treatise on "Tire Design with Relation to Comfort, Flexibility, and Wear," by T. M. Knowland of the Hood Rubber Company, who illustrated his paper with charts and slides showing the effect of tire design on the sidewall flexing point and on tread wear and slippage.

The afternoon session was adjourned shortly after five and the attendants spent an hour in social intercourse and informal discussion. After the demi-tasse, Dr. Allen W. Rowe, president of the Northeastern Section of the A. C. S., made a few remarks and introduced Dr. James F. Norris, of the Massachusetts Institute of Technology, a past president of the American Chemical Society. Dr. Norris gave a very interesting informal talk on his trip last summer to Soviet Russia.

Dr. W. B. Wiegand of Binney and Smith Company opened the evening session with a paper on "Deduction of Rubber Stress Strain Determinations." He followed through the results of a number of tests on the Scott machine for tensile and elongation and pointed the way to deduce a formula to arrive at the correct determination of these factors from a few tests.

Papers Read on Anti-Oxidants

Then followed two papers on the very alive question of anti-oxidants by Dr. E. R. Bridgwater of the E. I. Dupont de Nemours Company and Dr. Sidney M. Cadwell of the United States Rubber Company.

Dr. Bridgwater opened his talk, which was styled "Anti-Softeners and Fatigue Inhibition," by stating that all rubber stocks after vulcanization tend to revert, and that anti-softeners or anti-oxidants, which are the same thing, counteract this reversion. While he gave his opinion that oxidation did cause deterioration of rubber goods, he also thought that there were other causes which were more important. He cited some examples, among them that of a rubber boot folded in a carton on a shelf and laid away for several years, and when taken out shows a crack on the fold. "Is that oxidation?" he asked. Similarly soles crack at the stitches and across the ball of the foot, and tires crack in time. Anti-oxidants prevent that kind of oxidation; they also increase the flexing resistance in friction stocks.

But expose vulcanized rubber goods to the sun and light, and they perish and become deteriorated. Anti-oxidants do not prevent sun-checking. So far, the only way known to prevent sun-checking is to give the rubber surface a protective coating of some kind to prevent the sun's rays from attacking the rubber.

Classifies Accelerators as of Two Types

He classified accelerators as of two types, fugitive and non-fugitive, the fugitive being accelerators which disappear when vulcanization is completed, and the non-fugitive being ones which do not. He referred to over-curing as only hastening the process of reversion. He asked the question, "What is Reclaimed Rubber?" but a complete reversion. How is it done, by heat and by water which hasten oxidation, and by removal of free sulphur with caustic.

Discussion of Dr. Bridgwater's talk was deferred until Dr. Cadwell spoke on the same subject. He tackled the problem on a different theory and from a different angle than Dr. Bridgwater's first tracing the history of oxidation in rubber goods which was first noticed in 1865. He then pointed out that some of the early organic accelerators, particularly the anilines, were in themselves anti-oxidants. He showed samples of his own experiments with anti-oxidants on rubber thread and unvulcanized balata reduced to a thin consistency. He stated the use of anti-oxidants which has now become practically general throughout the industry, would save the consumers of rubber goods two hundred million dollars annually. He displayed samples of the various commercial anti-oxidants, Agerite Powder, VGB, Neozone, Stabilite, and Resistox, and discussed the derivatives of each. By means of charts he illustrated his theory of anti-oxidants and their effect, by showing how they flattened out the curve of deterioration as evidenced by comparative tests on tensile and elongation. While anti-oxidants do not prevent oxidation, they retard it and prolong the life of rubber goods several hundred per cent in many instances. His theory of the chemical reaction was that the anti-oxidant, in itself an oxidizing agent, combined with the oxygen present in the rubber compound to form an equalizing chemical reaction.

Ormsby-Gore Reports on Malayan Tour

Urges More Intensive Research and Scientific Planting With a View to Obtaining the Higher Possible Yield Per Acre as the Best Insurance for the Future Prosperty of the Industry.

AS a result of my inquiries in Malaya and Ceylon, reinforced by what I learned in Java, I am convinced that in research rather than restriction depends the prosperity of the rubber industry." Such is the conclusion reached by Colonial Under-Secretary W. G. A. Ormsby-Gore in his report on his visit to Malaya, Ceylon and Java, just published by the British Government as a Blue Book.

Mr. Ormsby-Gore, who devotes an entire chapter of his report to the question of rubber, protests strongly against the attitude of mind of those who would seek to retain the policy of State restriction, remarking that the attitude, "unfortunately too prevalent on the directing boards of some companies," ignores scientific research and looks to the Government for assistance in fixing prices on the basis of what the least efficient estates consider a reasonable level. As the result of scientific development, Mr. Ormsby-Gore forecasts many of the less progressive estates may be doomed to extinction, and an artificial scheme for bolstering up prices in British territory would merely hasten the day of reckoning.

He records that the Cabinet's decision to remove restriction was announced on the day he reached Malaya. Both in Malaya and Ceylon he found a general recognition that the restriction scheme could not continue in its existing form. The case against continuance is set out under two principal counts:

First, high prices and restriction have encouraged production outside the restricted area—particularly native production in the Netherlands East Indies—and the use of reclaimed rubber in the United States. For these reasons restriction was becoming ineffective for the purpose of regulating world prices and was likely to become increasingly ineffective the longer it continued. However favorable the level of prices might be, greater advantages would always accrue to the plantations outside the restricting area, which would be able to produce at full capacity and minimum cost. Restriction, in short, has had the effect of increasing relative costs and reducing relative profits in British Colonies and Protectorates as compared with Dutch Colonies.

Secondly, Mr. Ormsby-Gore is convinced that State interference was tending to undermine efficiency, to handicap scientific development, and to discourage a progressive attitude to the problem of higher yields and improved methods of cultivation.

Mr. Ormsby-Gore emphasizes the importance of native rubber, and observes "it appears at first sight that rubber production may conceivable follow the cocoanut industry and become a predominantly native crop." Developing his views, he says:

"Native production is the chief obstacle to all schemes of restriction and combination, and induces an element of competition which is destined to put the European estates, with their high overhead charges and costly management, to an increasingly severe test.

"Once the natives have acquired on European estates the necessary skill in tapping, there is little else to learn in order to obtain a livelihood. The native is already a serious competitor, because European estates have not in general achieved economies in yield and cultivation to offset their high costs of supervision.

"Those British planters and directors of companies who are skeptical as to the possibilities of bud grafting and scientific research may well ask themselves whether they will be able to compete in the long run with the native smallholder.

"The only justification for the present complicated and expensive mechanism of directors, agent firms, visiting agents, managers, and shareholders is the application of greater intelligence and skill than the native can reasonably be expected to acquire. Fortunately, some of the best brains in the industry have now realized that European capital, if it is to continue to play its part in rubber planting, must be linked with European science."

Regarding new uses, Mr. Ormsby-Gore says: "I have no doubt that before long a means will be found of covering pavements and streets with a durable, resilient, and silent surface of prepared rubber. I understand that there are many technical problems still to be solved, but the main condition is a vastly increased production at a lower cost per pound. The potential demand for paving purposes thus lends additional weight to the policy of higher yield per acre rather than restriction of output as the key to the future prosperity of the rubber industry."

Examination is made of the arguments put forward in support of some form of rationalization of the industry, and the view is strongly expressed that the less governments have to do with such schemes the better. Regarding the possibility of action by the Government of the Netherlands East Indies to support a restrictive scheme, Mr. Ormsby-Gore says:

"This Government does not seem to be specially alarmed at the prospects of the rubber industry and sees no particular reason for State intervention in rubber rather than in any other tropical product. The native has indeed been encouraged to plant rubber, and any scheme designed primarily to help European companies out of their difficulties at the expense of native production will be looked on with little favor. The Government takes the view that its first duty is towards the native smallholder, that European enterprise can look after itself, and that there is no case for State action to foster and support it by artificial means."

He considers it should be possible for something to be done to achieve a limited and reasonable degree of stabilization by cooperation between the principal producing interests and British and American manufacturers.

Regarding improvements in estate management, he thinks it almost certain that as a result of bud-grafting and selection, the cost of producing rubber will be considerably lowered. In five or six years, if not before, the competition of high-yielding estates with ouptuts of 1,200 to 1,500 pounds per acre will become increasingly effective and will even overshadow the menace of native rubber. In ten or twelve years it is not unreasonable to prophesy that no European estate with an output of less than 1,000 pounds per acre will be able to survive. This view is supported by some of the leading experts in the industry.

An Old Timer *in the* Rubber Industry Indulges *in* Retrospection

By Austen Bolam

FIFTEEN years isn't such an awful period in the history of a nation but it bridges a tremendous gap in the story of a comparatively new industry like that of tire manufacture.

While I am just old enough to remember the high bicycle and its successor, the "safety," with their solid tires about 1 inch in diameter, to recollect the sensation of the first pneumatic and the prediction that it was too clumsy to ever be a success and to recall also the early auto tires, which were practically glorified hose pipe—although I am old enough to remember these forerunners of the present rubber industry, my first practical acquaintance with tire manufacture came in 1911, when I blew into Akron from Canada and way stations and became a fixture for some years in one of the "big three" factories.

At that time the automobile was still in an extremely transitory state. Possibly one million were in use. Standardization had not even been dreamed of. In fact it was discouraged because "it would bring too many people into the game." We listed some 300 different sizes and styles of tires and actually made regularly about 150 or so. Detachable rims and straight sides being still in the future, it was a good honest hour or two's work to change a tire—and there were few service stations to undertake the job.

All tires were hand-made and of course with a fabric carcass. It took from several days to as many weeks to transform a farm hand into a skilled tire builder, at the princely wage of $3.50 a day. There was a cord tire in the background but even the owners of the patent didn't think it was more than a de luxe "fad." The output of the biggest plant was reputed to be about 6,000 a day and when, later on, our own factory first put out 10,000 tires in a day's work, the whole plant nearly went crazy.

All kinds of freaks called or wrote to the factory suggesting advertising stunts. If a man wanted to cross the continent or to put on some kind of circus act, he expected to get his tires free, in exchange for the display of pennants or similar valuable advertising. At one time almost every factory "fell" for this but we gradually grew wiser. Still we were always out to put one over on the other people and the early auto shows were the field of severe competition.

The adjustment nuisance was another fertile field of trouble. The adjuster was an important member of the branch office staff and to spend a day with him was an education in the seamy side of human nature. Tires cost more for one thing and a car owner would feel he had lost an opportunity if he failed to get some sort of an adjustment, regardless of such a minor matter as truth.

The tire factory of those days was a "family" affair. The "big boss" knew his men by their first names. Loyalty to the organization was our pride and a "deserter" to the opposition lost many friends. In fact, so far was this feeling carried that each of the "big" factories formed a social organization of its own.

Akron was still below the 100,000 population mark but every train brought its crowds of "hunkies" fresh from the boats and the labor offices were besieged all day long. The principal hotel, then newly opened, could not hold its waiters more than a few days after they got wise to the fabulous wages being paid in the rubber factories. Acute housing shortage made living conditions simply chaotic and it was not uncommon for the rooming houses to run "double shifts," with four to eight men sleeping in a room, day and night. With business good, "boom" prices prevailed, "plent' vork, plent' money, Vy shouldn't you pay?" as one local storekeeper put it.

Outside of the big factories, there was, so far, little local competition. "Big Finance"—and the War combined with the gigantic expansion of the automobile industry, have transformed the entire structure and, today, Akron, while still the "Rubber City," has far outgrown its former limits, social and otherwise.

Schaphorst's CHATS *with the* ENGINEER

By W. F. SCHAPHORST, M.E.

Energy in Flywheels

NOT so many years ago when I was asked: "How do you compute the energy stored in flywheels," it was habitual with me that I would glibly reply: "Substitute in the old formula $\frac{W V^2}{2 g}$," where W is the weight of the rim of the wheel in pounds, V is the velocity of the center of gravity of this rim in ft. per second, and g is 32.16, the acceleration constant due to gravity. This formula is very good for all ordinary purposes and I do not wish to belittle its value, but has the complexity of an exact solution ever been called to your attention? I always assumed the old formula to be exact until a short time ago when I began pondering over the energy carried by the arms or "spokes" of the flywheel.

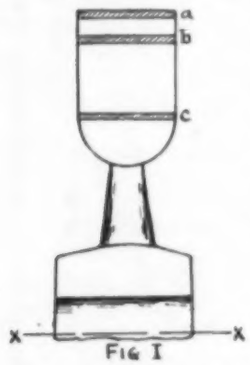


FIG I

In Fig. 1 I show a cross section of a typical flywheel and on this section I show three narrow strips, *a*, *b*, and *c*. Strip *a* is farthest from the axis of rotation and its velocity is therefore greatest—greater than the velocity of strip *b* and considerably greater than the velocity of strip *c*. Since the energy stored in each strip varies with the "square" of the velocity and not directly with the velocity, the energy stored in *a* is much greater than that stored in *c*. Therefore the accurate way to determine the total stored energy is to divide the rim into narrow strips as indicated, compute each strip separately, and then add them. The sum will be the total. If the rim section were perfectly square as indicated in Fig. 2 a formula could easily be derived that would tell us exactly where to assume the entire mass to be concentrated—distance *r* from the axis—but since rims are never square the formula would do you no good. It is evident, however, that *r* is greater than *c*, where *c* is the distance of the center of gravity of the section from the axis.

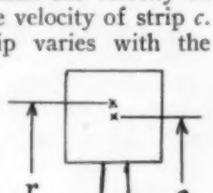


FIG II

As for the arms the same reasoning applies as already stated. Strip *d*, Fig. 3, stores much more energy than strip *e* because of the greater distance of the former from the axis. Where the arm is of equal cross section from one end to the other, it is nearly correct to assume the entire weight of the arm to be concentrated at a distance ¼ L from the axis.

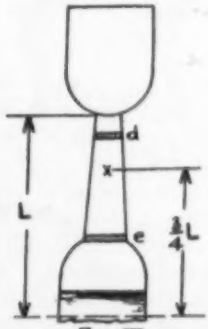


FIG III

Since the arms are seldom considered in ordinary flywheel computations, their consideration would have the effect of throwing the velocity point still farther out and the writer therefore holds that in making ordinary every day calculations we may as well use the velocity of the "outside" of the rim in the standard formula $\frac{W V^2}{2 g}$.

In other words, instead of measuring from center of gravity of the rim sections, simply measure the outside diameter and then substitute in this formula:

$$\text{Energy} = \frac{WD^2 N^2}{3{,}370{,}000} \text{ which is the same as}$$

$$\text{Energy} = .000000296\, WD^2 N^2.$$

Where W = Weight of rim in pounds;
D = Outside diameter of rim in inches;
N = Rev. per minute.
Energy is in foot pounds.

Please note that W is the weight of the rim only and is NOT the weight of the entire flywheel.

Cushion Suits for Aviators

AS PART of its line of more than fifty different types of pneumatic cushions, the Eno Rubber Corporation, 1726 South Los Angeles street, Los Angeles, Cal., is now manufacturing special cushion suits for the use of aviators. These are so designed as to provide a pneumatic cushion seat for the flyer, while at the same time affording protection from the rubbing and chafing of the customary parachute harness. They are readily put on by the aviator, the upper portion slipping over his head before the parachute harness is attached, as shown in the accompanying illustrations, and they will not interfere in any way with his movements in deflated, occupy very little space.

The cushions can easily be inflated or deflated and, when the navigation of his plane. In addition to their primary purpose of providing added comfort in long hours of flight, these cushions may also be of vital importance as life preservers in the event that a forced landing is made in the water.

This type of cushion has been used by the Douglas Company, the Western Air Express, the Lockheed Aircraft Corporation and several other well known aircraft and air transportation companies, as well as by Art Goebel, Roscoe Turner, Jack Iseman, and many of the other distinguished Army, Navy, and civilian pilots. They are sold in the west by the Western Auto Supply Company, which operate 170 stores throughout the western states.

In addition to these aeronautical cushions, the company manufactures pneumatic cushions under the brand name of "Oso Soft" for motor boats, automobiles, hospitals, offices, stores, and other purposes. Pneumatic mattresses and a special swimming belt are also included in this line, as well as cushions for the use of duck hunters and other sportsmen.

RUBBER CHEMISTRY and Technology

A Comparison of the Rate of Combination of Sulfur With Rubber and the Rate of Vulcanization*

The Influence of the Type of Accelerator Used, Percentage of Accelerator and Percentage of Total Sulfur Present Upon the Relative Rates of Sulfur Combination and of Vulcanization

By E. R. BRIDGWATER

Dyestuffs Dept., E. I. Du Pont de Nemours & Co., Inc., Wilmington, Del.

IT has been recognized for many years that accelerated compounds usually develop their maximum physical properties with a lower percentage of combined sulfur than is required for the correct vulcanization of an unaccelerated compound. It is furthermore well known that accelerators differ among themselves with respect to the degree of sulfur combination which accompanies a given degree of vulcanization. This has been attributed by some to the fact that accelerated compounds are exposed to less heat for shorter periods of time than unaccelerated ones. Others have suggested that accelerators may have a specific physical effect on the rubber which accounts in a large measure for the low combined sulfur required for vulcanization in the presence of some accelerators. The primary purpose of the tests described herein is to determine which of these effects is primarily responsible for the low combined sulfur at correct cure which characterizes highly accelerated stocks.

The rate of combination of sulfur with rubber is generally recognized not to be a measure of the rate of vulcanization. For the purposes of this discussion we will define vulcanization as a change in the physical state of the rubber which is accompanied by an increase in the tensile strength and stiffness of the product and by a decrease in the rate of swelling in hydrocarbon solvents. Other changes which take place on vulcanization are an increase in the elasticity and a decrease in the tackiness. These changes are also often used for the purpose of measuring the rate of cure or determining the correct cure but have not been considered in this study.

If the low combined sulfur required for correct cure of accelerated compounds were due wholly to the fact that accelerated compounds are vulcanized at lower temperatures for shorter periods of time and therefore subjected in a lesser degree to the deteriorating effect of heat, we would then expect that the combined sulfur at the correct cure or at comparable states of cure would be the same for all compounds having the same rate of cure, regardless of what accelerator was used. The data shown in Table I prove that such is not the case. This table shows the stress-strain properties and combined sulfur for several different cures of four rubber compounds. The compounds are identical excepting that a different accelerator was used in each and the percentages of accelerator so proportioned as to give approximately the same rate of cure. The accelerators used were chosen to represent four distinct types of accelerator. The first is commercial Vulcanex which is typical of the aldehyde-amines resinified with formaldehyde. The second is commercial Vulcanol, a thiazine derivative. The third is mercaptobenzothiazole and the fourth methylene-para-toluidine which is representative of the simple Schiff's bases. The first three compounds have substantially identical rates of cure as judged by the stress-strain properties. The fourth is somewhat slower curing. The table also shows the percentage of combined sulfur to the rubber at each cure and the percentage of benzol that is absorbed during 15 minutes' immersion at 82°F. The benzol used was a standard commercial grade having the following distillation range:

F.D.	42.5°C.
5 cc.	52.0°C.
25 cc.	63.0°C.
50 cc.	74.5°C.
75 cc.	96.0°C.
85 cc.	106.0°C.
92 cc.	121.0°C. (dry)
Residue	2.5 cc.

Although the Vulcanex, Vulcanol and mercaptobenzothiazole compounds have identical rates of cure as judged by the stress-strain properties, the rate of combination of sulfur is not the same and neither is the benzol absorption. The rate of combination of sulfur with rubber is distinctly lower for the Vulcanol compound than for either the Vulcanex or mercaptobenzothiazole compound. On the other hand, the Vulcanol compound is stiffer at comparable cures than the mercaptobenzothiazole compound and absorbs benzol less

*Paper delivered at annual meeting of Rubber Division, A. C. S., at Swampscott, Mass., Sept. 10-15, 1928.

TABLE I

Relationship Between Combined Sulfur and State of Cure

Formula	
Smoked Sheets	100.0
Zinc Oxide	10.0
Stearic Acid	1.0
Sulfur	4.0
Accelerator	As Noted

Accelerator	% Used	Cures	Combined Sulfur	Benzol Absorption	Stress at Elongations of 300%	400%	500%	600%	700%	800%	Tensile Strength	Ultimate Elongation
Vulcanex	0.875	20x140	1.32	69	150	250	450	925	1675	2800	2925	810
		45x140	2.38	61	225	375	675	1450	2625	.....	3025	730
		90x140	3.28	60	250	450	850	1725	.....	.....	2900	690
Vulcanol	0.375	20x140	0.95	74	100	150	275	575	1050	1875	2350	850
		45x140	2.00	64	175	350	575	1125	2225	.....	3375	790
		90x140	2.82	62	225	400	700	1425	2600	.....	2900	720
Mercapto-benzothiazole	0.375	20x140	1.19	73	150	175	275	475	950	1700	2350	870
		45x140	2.32	70	175	250	400	750	1425	2575	2575	800
		90x140	3.30	69	175	300	500	850	1575	.....	2525	780
Methylene-para-toluidine	2.0	45x140	1.20	66	125	175	500	600	1175	2050	2400	830
		90x140	2.34	61	225	425	775	1675	3100	.....	3225	710

TABLE II

Relationship Between Combined Sulfur and State of Cure

Formula	
Smoked Sheets	100.0
Zinc Oxide	10.0
Stearic Acid	1.0
Sulfur	4.0
Accelerator	As Noted

Accelerator	% Used	Cures	Combined Sulfur	Benzol Absorption	Stress at Elongations of 300%	400%	500%	600%	700%	800%	Tensile Strength	Ultimate Elongation
Vulcanex	1.75	*30x130°C.	1.67	56	175	275	550	1150	2100	.....	3250	780
		60x130°C.	2.47	52	225	425	825	1775	3150	.....	3725	735
Vulcanol	0.75	*20x130°C.	1.09	54	175	250	450	850	1675	2875	3300	840
		45x130°C.	2.15	51	225	425	750	1625	3150	.....	3600	730
Mercapto-benzo-thiazole	0.75	*20x130°C.	1.33	65	150	250	425	800	1550	2700	3000	830
		45x130°C.	2.43	63	200	375	675	1425	2575	.....	3350	750
Tetramethyl-thiuram-monosulfide	0.10	*20x130°C.	1.47	63	200	325	550	1125	2150	3275	3550	810
		45x130°C.	2.50	59	225	425	650	1250	2425	.....	3050	750
		90x130°C.	3.12	61	250	425	650	1250	2300	.....	2975	750

*Indicates best cure, as judged by tear, tack and snappiness.

readily. The Vulcanex compound is stiffer than either of the others and absorbs benzol still less readily than any of the three cures which were run. However, the rate of combination of sulfur with rubber is practically the same for the Vulcanex compound as for the mercaptobenzothiazole compound. These data clearly show that the time and temperature of cure are not the sole factors in determining the amount of combined sulfur required to produce any given state of physical cure.

The compound accelerated with methylene-para-toluidine cures more slowly than any of the others. The combined sulfur at the 90 minute cure is practically the same as the combined sulfur at the 45 minute cures of the Vulcanex and mercaptobenzolthiazole compounds but they are less fully cured in 45 minutes than is the methylene-para-toluidine compound in 90 minutes. These tests indicate that there is no relationship between the combined sulfur required for a given state of cure and the activity of the accelerator. Such a relationship has often been said to exist, that is, rubber chemists have generalized that active accelerators or ultra-accelerators were in general low sulfur accelerators. Such does not seem to be the case. The combined sulfur required for correct cure also appears to have no relationship to the modulus characteristics of the accelerator and is certainly unrelated to the benzol absorption because the one of these four accelerators which requires the least combined sulfur for correct cure, namely Vulcanol, produces compounds which swell in benzol as little as any.

Percentage of Accelerator Doubled in Table II

Table II shows the results of similar tests on three compounds which are identical with the first three shown in Table I excepting that the percentage of accelerator is doubled in each case. The fourth compound in Table II is accelerated with tetramethylthiuram-monosulfide, the percentage being such as to give the same rate of cure as that of the other three compounds. These compounds were cured at 130°C., whereas those in Table I were cured at 140°C. We again find that Vulcanex and Vulcanol produce compounds having the same benzol absorption at comparable cures but that the mercaptobenzothiazole and tetramethylthiurammonosulfide compounds have distinctly higher benzol absorption values at equivalent cures. Equivalent cures is here used as meaning cures having similar stress-strain properties. These tests also check those in Table I in that the Vulcanol compound has lower combined sulfur at comparable cures than any of the others. It is worthy of note that the most powerful of these four accelerators, tetramethylthiuram-monosulfide, is not the one that produces the lowest combined sulfur at the correct cure, again emphasizing the fact that there is no relationship between the activity of an accelerator and the combined sulfur at correct cure. There is also no direct relationship between the modulus characteristics of the accelerator, the combined sulfur and the benzol absorption.

The tests shown in Table III illustrate the effect of the percentage of accelerator used on the percentage of combined sulfur required to produce any given state of physical cure. The same accelerator was used in all of the compounds. The first compound containing 0.375% of accelerator is correctly cured in 60 minutes at 140°C. The second compound contains 2 1/3 times as much accelerator and is correctly cured in 1/3 the time required for the less highly accelerated compound. The stress-strain properties of the 20 minute cure for the compound containing 0.875% of accelerator and of the 60 minute cure for the compound containing 0.375% of accelerator are identical but the more highly accelerated compound has a much lower combined sulfur. The third compound contains twice as much accelerator as the second. The 60 minute cure at 130°C. has the same stress-strain curve as the 90 minute cure at 140°C. of the compound containing half as much accelerator but again the combined sulfur of the more highly accelerated compound is lower. Comparing the data in this Table with Tables I and II it appears that the percentage of accelerator has a greater influence upon the combined sulfur required for correct cure than the nature of the accelerator used.

Effect of Percentage of Sulfur

The data shown in Table III give no indication as to whether the lower combined sulfur for the more highly accelerated compounds is due to the stiffening or polymerizing action of the accelerator or merely to the lesser deteriorating effect of heat. Table IV, however, shows the effect of increasing the rate of cure by increasing the percentage of total sulfur making no change in the percentage of accelerator or in the other ingredients of the compound. The curing temperature is the same for all three stocks, 130°C. There is little difference between the combined sulfur of the compound containing 4% of sulfur cured 20 at 130 and of the compound containing 2% of sulfur cured 45 at 130. These compounds have approximately the same rate of cure. The compound containing 8% of sulfur cured 10 at 130 also has about the same rate of cure but has distinctly lower combined sulfur. The compound containing 8% of sulfur cured 20 at 130 is slightly more fully cured than the compound containing 4% of sulfur cured 30 at 130. However, in spite of the fact that it is more fully cured, the combined sulfur is distinctly lower. The benzol absorption progressively decreases as the rate of cure is increased by increasing the percentage of total sulfur. Compare the benzol absorption of the 45 minute cure on the compound containing 2% of sulfur, the 20 minute cure containing 4% of sulfur and the 10 minute cure on the compound containing 8% of sulfur. These are equivalent cures but the benzol absorption decreases as the rate of cure increases.

If we assume that the only effect of increasing the percentage of total sulfur is to increase the rate of cure due to the mass-action effect of the accelerator, we may then definitely state that the low combined sulfur at correct cure of accelerated compounds is due in part to the shorter time and lower temperature that is required for cure. This conclusion follows from the fact that the faster curing compounds in Table IV had lower combined sulfur at comparable

TABLE III

Combined Sulfur vs. State of Cure (Varying Amounts of Accelerator)

Formula	
Smoked Sheets	100.0
Zinc Oxide	10.0
Stearic Acid	1.0
Sulfur	4.0
Vulcanex	As Noted

% Vulcanex	Cures	Combined Sulfer	Benzol Absorption	Stress at Elongations of 300%	400%	500%	600%	700%	800%	Tensile Strength	Ultimate Elongation
0.375	60x140	1.74	69	175	250	400	775	1550	2750	2875	810
0.875	20x140	1.32	69	150	250	450	925	1675	2800	2925	810
	45x140	2.38	61	225	375	675	1450	2625	.....	3025	730
	90x140	3.28	60	250	450	850	1725	.....	.....	2900	690
1.75	30x130	1.67	56	175	275	550	1150	2100	.....	3250	780
	60x130	2.47	52	225	425	825	1775	3150	.....	3725	735

TABLE IV

Combined Sulfur vs. State of Cure (Varying Amounts of Sulfur)

Formula		% Sulfur	Cures	Combined Sulfur	Benzol Absorption	Stress at Elongations of 300%	400%	500%	600%	700%	800%	Tensile Strength	Ultimate Elongation
Smoked Sheets	100.0	2.0	30x130	0.70	74	100	175	325	650	1225	2175	2400	825
Zinc Oxide	10.0		45x130	0.97	73	175	225	425	825	1625	2800	3075	820
Stearic Acid	1.0		90x130	1.21	68	200	300	550	1125	2125	.....	2900	755
Vulcanex	1.75	4.0	20x130	1.17	67	150	225	400	725	1375	2400	2600	815
Sulfur	As Noted		30x130	1.67	66	175	275	550	1150	2100	.....	3250	780
		8.0	10x130	0.76	59	150	225	400	750	1375	2300	2475	820
			20x130	1.50	54	175	350	575	1175	2150	.....	3400	790

cures than the slower curing compounds although the percentage of accelerator was the same throughout.

Summary:

The following general conclusions can be drawn from these experiments:

1—The low combined sulfur at correct cure which is, in general, characteristic of fast curing compounds is due both to the stiffening or polymerizing action of the accelerator and to the fact that fast curing compounds suffer less heat degradation during the cure. Some accelerators have a greater physical stiffening or polymerizing effect than others, that being the only way one can account for the difference in the rate of sulfur combination between Vulcanol and mercaptobenzothiazole, since Vulcanol which causes the combination of sulfur at a lower rate causes physical vulcanization or stiffening of the rubber at a higher rate.

2—The differences in the combined sulfur required to produce correct cure between one accelerator and another are not large as compared to the differences which result from changing the percentage of any given accelerator.

3—Accelerators differ among themselves in the benzol absorption which they impart to compounds. Neither the stress-strain curve nor the combined sulfur gives any information as to what the benzol absorption may be. The benzol absorption at any given state of physical cure depends even more upon the rate of cure of the compound than upon the accelerator used. In general, the higher the percentage of accelerator the lower is the benzol absorption. The effect of high sulfur is apparently due to the rate of cure and not to the sulfur itself because the high sulfur compounds which swell relatively little in benzol have low combined sulfur. It is indicated that oil resisting stocks should be highly accelerated but not overcured. In no case has curing beyond the point of maximum stiffness of the stress-strain curve caused a decrease in the benzol absorption. Referring to Table I, there is but little difference between the benzol absorption between 90 and 45 minute cures of either of the first three stocks. To state it another way, benzol absorption depends nearly as much upon the rate of cure as upon the state of cure. These facts should be borne in mind in compounding oil resisting stocks.

Measuring Labor in the Industry

(*Continued from page* 432)

is obtained by multiplying the standard cost per B by the department B hour, and dividing the product by the actual B cost.

It becomes evident that if a supervisor allows his department B hour to decrease through losses of possible production, his actual B cost increases beyond standard, automatically reducing the supervision B hour below that of the department, thus reducing the foreman's bonus.

Inspection is another form of endeavor which can be controlled by Bedaux. It is divided into preventative and positive. Preventative, or floor inspection, is rewarded on the relation of the department B hour to percentage of scrap, in a ratio making it more profitable to the inspector to have a department B hour of 60 with no scrap, than a higher B hour with a scrap percentage above zero.

Installation of the Bedaux system is performed by the Charles E. Bedaux Companies, who maintain a staff of engineers for this purpose. The cost of installation is charged by an hourly fee, the resident engineer punching his time like a plant worker; no contracts are required; and the service can be terminated at any time. The plant's time study staff is instructed in its methods so that they can carry on the work after the Bedaux engineer has left the plant.

The results of Bedaux application in over 200 plants in different industries in the last eleven years has been an increase of production of 44%, accompanied by an average reduction in labor costs of 20%, and an increase in labor earnings of 15%.

Albasan

ALBASAN is the name of the newest anti-oxidant offered by the Naugatuck Chemical Company, New City. It was developed, according to its manufacturers, to meet a demand for a satisfactory anti-oxidant for light colored, bright colored and blooming goods. In most cases it can be considered as practically without effect on the color of goods either during the cure or upon exposure to light after the cure. Albasan facilitates the regular factory operations of milling, calendering and tubing.

It is pointed out that rubber manufacturers would probably find no advantage in substituting Albasan in those products in which VGB and other materials are used with complete satisfaction. Albasan was developed, and is strongly recommended, for use in those plants in which no anti-oxidant has proven satisfactory. Samples and descriptive matter are ready for distribution.

I. R. I. Holds Seventh Annual Meeting

THE seventh annual meeting of the Institution of the Rubber Industry, which was held in London on January 3, was also the occasion of a Conference on Rubber Roadways and Floor Coverings, under the joint auspices of the Institution and the Rubber Growers' Association. All delegates to the meeting were the guests of the Institution at afternoon tea and at a complimentary dinner to Lord Colwyn, president of the Institution.

The annual report of the Council of the Institution for the year ended August 31, 1928, and which was presented at the afternoon meeting, showed the preceding year to have been one of considerable progress in the work of the Institution. Lord Colwyn was re-elected president.

One of the interesting features of the program was the awarding of diplomas to the recently elected Fellows of the Institution, among which are four distinguished American rubber technologists: John M. Bierer, of the Boston Woven Hose and Rubber Company; R. P. Dinsmore, Goodyear Tire & Rubber Company; W. C. Geer, formerly of the B. F. Goodrich Company, and Dr. David Spence, of the Intercontinental Rubber Company.

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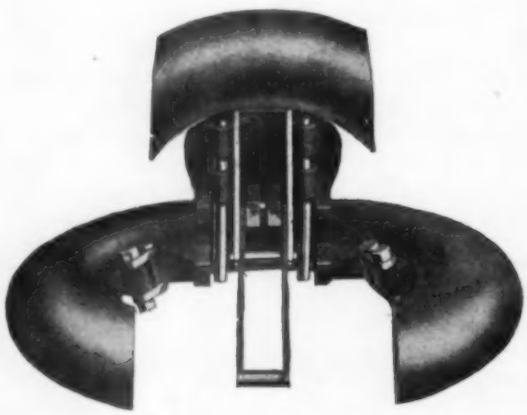

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EDITORIAL COMMENT

Turning Off the Spigot

IN several large cities of the United States, particularly in the East, there are groups of merchants who make their living on the inefficiency of rubber manufacturers. They are the odd lot buyers. In talking with one of these buyers recently, the writer was surprised to learn of a purchase from a large rubber company of 90,000 units of a standard rubber product with a slight construction variation from standard. The price he paid would not even compensate for the material in the article, let alone labor, or overhead. Yet it was all they were worth in the discontinued merchandise market.

"But 90,000," the writer protested, "why did they ever make so many?"

"Well, I will tell you," said the purchaser. "Sometimes these big rubber companies turn on the spigot and forget to turn it off!"

There is no criticism against the merchant who makes his living buying and selling the discontinued lines of rubber manufacturers, but there is justifiable criticism against the system which allows such great economic waste. Of course, there is no way of determining how much is the total of this hidden waste, but it is safe to estimate that it costs the rubber industry several million dollars each year.

This is not a simple problem to which a cure-all remedy can be applied. Its solution must be found in several fields, some of which are merchandising, co-ordination between sales and manufacturing, and standardization.

It follows, almost without repeating it, that the more standard the product and the more simplified the variety of it, the fewer are the chances of this waste creeping in. But despite all the standardization propaganda fostered by the Department of Commerce, some rubber companies are still heading in the direction of multiplication and diversification as fast as they can go, almost without realizing it. Why? The answer is found in competition.

Mr. EDWARD A. FILENE, president of a large department store in Boston which bears his name, once pointed out in an address, that the manufacturer who seeks to avoid competition by producing an article so distinctive and different that it is in a class by itself is digging his own grave. He concurs with Mr. Ford in the doctrine that it is selling price which should determine cost, and that the selling price should be set at a point which would insure the greatest demand, thus insuring the economies of mass and volume production. To do this, a standard article should be produced. In other words, he tells the manufacturer to face the issue and put his house in order.

"Let not the left hand know what thy right hand doeth," says the Bible, and this is just what has been frequently going on between sales and manufacturing departments. The sales department, if it is functioning properly, has its finger on the pulse of its market, and every indication of a change in trend would mean thousands of dollars saved if passed along to the production department. But most of this information never gets there, until it is officially decided to cut out a certain line. Then it is too late to make a clean cut-off; so the next best expedient is taken. All the materials, left-overs, and finished product are unceremoniously dumped on the market and the losses written off. But not always under this classification. Somewhere in the balance sheet, hidden away, they are there as contributory causes to losses, or reduced profits.

Sometimes the blame falls entirely upon the sales department and can be charged to bad merchandising. A sales program on a product is laid out and the plant given a production schedule to produce the goods. The sales do not materialize and Mr. Second Hand Man pulls up to the back door again. This is probably the most difficult phase of the problem to solve. For who can measure one man's judgment against another's?

Notwithstanding the difficulties, there is a tidy sum of money to be saved for the rubber companies, if they will just face the issue, and go after it.

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Representatives in all the rubber centers of the United States, Canada, England, France, Germany and the Middle East.

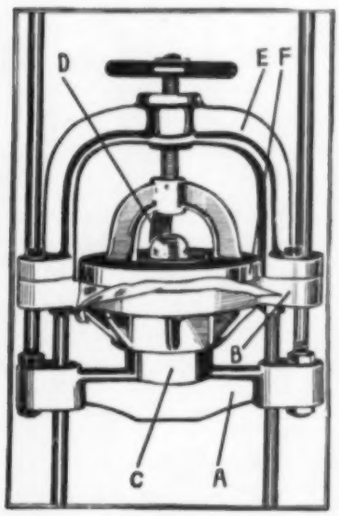
SCOTT'S BALL BURST TESTER

Patent Pending

The principle of the test is the bursting action of a steel ball forced upwards through the fabric which is held in ring shaped clamp of definite opening.

All diaphram error is thereby eliminated.

A quick and easy method of high accuracy for testing looped construction fabric which has been proven by literally thousands of tests made solely for the purpose of comparison.



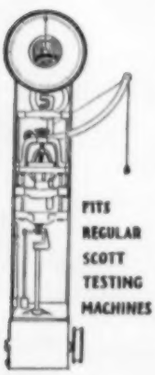
A. is the lower part of the apparatus which is attached through the side rods to the head of a test machine.

B. is the upper part attached through the side rods to the pulling member or gear box of the tester and also carries the ring clamp in which the specimen is fastened.

C. is the guide carrying the post on top of which rests the steel ball.

D. is the steel ball showing through the test ring in much the same position as it appears at time of rupture of the sample.

E. is the testing ring saddle. It consists of the testing ring F and clamping device to fasten the fabric to be tested.



The test is performed in this manner: The upper section carrying the ring shaped clamp holding the fabric is attached to the main screw or draw bar of the test machine and is drawn downward by the movement of the apparatus. This lower section of the apparatus carrying the ball is attached to the registering end of the tester. The fabric is thus drawn down over the ball and force exerted to rupture the fabric is recorded on the dial or recorded in terms of load versus extension on the autographic recorder of a *Serigraph* or other autographically recording testing apparatus.

This attachment is furnished for use on all models of Scott Cloth Testers.

Write for further information.

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Blackstone St., Providence, R. I.

The Unexcelled Softener

ARLINGTON MILLS

DEGRAS

PURE WOOL GREASE

The Ideal Emollient for overcoming the surface tension of carbon black and effecting its complete and rapid dispersion in the rubber stock.

W. L. Montgomery & Co.

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Smoothness of the surface of a rubber product is noticeable where Factice is used

The STAMFORD RUBBER SUPPLY COMPANY

STAMFORD, CONN.

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QUALITY CHEMICALS

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Stocked at Akron, Ohio.

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INCORPORATED

1909-25 CLIFTON AVE., CHICAGO, ILL.

SHORT NEWS & DEPARTMENTS

Names in the News
Rubber Goods & Specialties
Foreign Rubber News
Crude Rubber Items

2,000 SAFETY SLOGANS IN FIRESTONE CONTEST

The recent safety slogan contest conducted among its employes by the Firestone Tire & Rubber Company drew nearly 2,000 slogans, from which the best were selected for prizes. The four slogans that won the cash awards were the following:

"Be careful. This is a non-skid organization. Don't slip."

"Safety pays—ask the man on compensation."

"Quality products are attained by careful employes."

"You took a chance and got by—but tomorrow may be different."

Parkland Ends Business

The Parkland Tire & Rubber Company, Louisville, Ky., which has been in process of liquidation since June 4 last, has wound up its business, paying up all claims on the basis of 100 cents on the dollar and retiring from the tire manufacturing business. All equipment and machinery, as well as stock on hand, have been disposed of.

N. J. Zinc Stock Split

The directors of the New Jersey Zinc Company have voted to recommend to stockholders a change in par value of the capital stock to $25 from $100 and an exchange of four shares of the new stock for nual meeting to be held February 27. Stock holders will act on the proposal at the annual meeting to be held February 27.

Firestone Increases Business

The Firestone Tire & Rubber Company is now producing about one-third of the tires that are used by the Ford Motor Company, whose tire business is split up among four manufacturers. Ford production has been climbing week after week, and the volume and value of the Firestone account has been steadily increasing in proportion.

Thropp Workers Entertained

The William R. Thropp & Sons Company, Trenton, N. J., entertained 35 of its employees at a dinner on December 20. Joseph W. Thropp, secretary and treasurer of the company, acted as toastmaster, and talks were made by different officials of the organization.

New U. S. Airbag Named

The United States Rubber Company will shortly place on the market a new airbag under the name of "Supercore." The name for the new product was selected in a $100 prize contest, the winning name being submitted by Leslie N. Rowe, tire repairman for the Crissey Tire Shop, Lake Park, Ia.

SAYS GOODYEAR BLIMP STAMPEDED HIS TEAM

Thornton F. Neiswonger, a farmer living near Alliance, O., entered a $25,000 damage claim in the federal court at Cleveland against the Goodyear Tire & Rubber Company and the Akron *Times-Press* on December 21, charging that he was seriously and permanently injured when the Goodyear dirigible "Puritan" caused his team of horses to run away. Through his lawyer, Earl D. Blair, he claims that the blimp was delivering a football "extra" edition of the Akron newspaper on October 29 when it flew so low over his farm as to frighten the team he was driving and that in the runaway he was thrown from his wagon and the wheels passed over his neck and chest.

Neiswonger charges that the dirigible was flying at an altitude of 150 feet, 350 feet lower than the minimum stipulated in federal aviation statutes. The case is the first "aviation suit" ever filed in the United States court at Cleveland.

Hood Dividends Declared

The Hood Rubber Company, Watertown, Mass., has declared the regular quarterly dividends of $1.87 on preference stock and $1.75 on preferred, both payable February 1 to stock of record January 21. The Hood Rubber Products Company has declared its regular dividend of $1.75 on the preferred stock, payable March 1 to stock of record as of February 20.

Cutting Die Firm Formed

The Cutting Die & Machine Company of America, Inc., Lynn, Mass., has been incorporated with a capital stock of 625,000. The incorporators are James V. Knox, Lynn, Mass.; E. M. Savels, Worcester, Mass.; and Joseph C. Tougas, Brockton, Mass. The company represents the consolidation of five former companies in this line of business.

The board of directors of Stedman Products Company, South Braintree, Mass., manufacturers of Stedman Naturized reinforced rubber flooring, has declared the 41st consecutive quarterly dividend of $1.75 per share on the preferred stock of the company.

PRODUCTION MANAGERS AT CLEVELAND RUBBER PLANT

The production managers' group of the Cleveland Chamber of Commerce on January 22, made an inspection of the plant of the Mechanical Rubber Company, a subsidiary of the United States Rubber Company. Nearly 100 production managers were present and saw motion pictures illustrating the gathering of raw rubber on plantations of the United States Rubber Plantations, Inc., in Sumatra and the progress of rubber manufacture from tree to factory.

The different steps in the washing, compounding and molding of rubber were shown to the visitors from the first arrival of the crude rubber at the plant to its final form as rubber hose, jar rings, tire tape, toys, rubber matting and other products.

Goodyear Directors Meet

Directors of the Goodyear Tire & Rubber Company met at the Union Club, Cleveland, O., on December 21 and were informed by President P. W. Litchfield that prospects for 1929 were exceedingly bright. President Litchfield said, however, that there is no intention of putting the common stock of the company on a dividend basis. The directors gave their formal approval to the building of the new plant at Gadsden, Ala.

New Ajax Tire Branch

The Ajax Rubber Company, Inc., has taken a lease on the entire second floor of a large building at 2617 Walnut street, Kansas City, Mo., for use as a factory branch. The new location will give the company considerably more space for its branch which for years has been located at 1730 Grand avenue. M. H. Flournoy is the local manager.

Dryden Building Addition

The Dryden Rubber Company, Chicago Ill., manufacturers of mechanical rubber specialties, has begun the erection of an addition to its mill, to be 85 by 125 feet in size, and to cost approximately $150,000, including equipment. It is expected that the structure will be ready for equipment installation in a few months.

Witco Made Pine Tar Agent

Wishnick-Tumpeer, Inc., New York City, have been appointed exclusive sales agents for the Piney Woods brand of pine tar and pine tar oil. In making this announcement, the Georgia Pine Turpentine Company, makers of this brand of products, state that the New York office of the company has been discontinued and that all sales matters will be handled through the offices of Wishnick Tumpeer, Inc.

HEEL AND SOLE DIVISION OF RUBBER ASSN. MEETS

The Heel and Sole Division of the Rubber Association of America met at the New York Athletic Club on January 15th. Chairman Herbert A. Derry of the United States Rubber Company presided and sixteen representatives attended.

A sub-committee reported on publicity given to the recently adopted standard warranty on black and tan composition soles through page advertising in trade papers, and it was decided to mail reprints of this advertisement to a large list of retailers, shoe manufacturers and jobbers.

It was generally agreed that closer cooperation between production departments and sales departments in the individual companies would be desirable as a means of reducing excessive inventory stocks.

It is expected that the next meeting of the Division will be held about April 1st, and probably in New York.

Fred W. Hagloch

Fred W. Hagloch, well known Akron architect who was associated with the B. F. Goodrich Company several years ago before establishing his own office, died at the age of 58 on January 5 after a brief illness of double pneumonia. At the time of his death he was head of the Practical Engineering Company.

Nigel G. Bruce

Nigel G. Bruce, associated with the Goodyear Tire & Rubber Company for the last 15 years, died on January 2 at the Peoples Hospital, Akron, O., after an attack of peritonitis. Mr. Bruce, who was 37 years old, was on the staff of the experimental department of Goodyear prior to his death.

He came to Akron from Washington, Pa., following his graduation from Washington & Jefferson College. He was a member of the Masonic, University and Fairlawn Country clubs.

Funeral services were held on January 4. Mr. Bruce leaves his widow, Elizabeth Watt Bruce; his parents, Mr. and Mrs. Thomas H. Bruce, of Washington, Pa.; three brothers and two sisters.

IOWA TOY BALLOON FLIES 1,000 MILES

A toy balloon landed in Chesterfield, Mass., last month after having been released two days previously in Dubuque, Ia., 1,000 miles distant by air line. The rubber balloon was released by fifteen-year-old Paul Frantzen in celebration of the scoring of a touchdown in a football game by his school, Columbia Academy.

The balloon was one of a hundred that were allowed to float into the air as Barkely, the academy star player, finished a 96-yard dash for a touchdown against the team of St. Ambrose, of Davenport, Ia. All the balloons had names and addresses of the students attached, and a prize was offered to the one whose balloon traveled farthest.

Companies Get Tax Refunds

Several manufacturing companies at Trenton, N. J., have received refunds of money paid as income taxes to the government for the fiscal year ended June 30, 1928. The Joseph Stokes Rubber Company received $190,603, the Acme Rubber Manufacturing Company, $720, and the Crescent Insulated Wire & Cable Company, $5,223. The estate of George R. Cook, late head of the Acme, Hamilton and Combination Rubber Companies, received a refund of $7,812.

Rubber Stocks Continue To Rise on Exchanges

The stock issues of the various rubber manufacturing companies on the New York and Cleveland exchanges have continued to show gains over the last fortnight in practically every instance. Faultless, Goodrich preferred, India, and U. S. Rubber touched new high points for the year, Mohawk and Seiberling being the only issues to show declines.

The markets have shown considerable activity in rubber shares and some of the trading has been in blocks of unusual size. The activity of U. S. Rubber just prior to the recent change in its presidency was particularly marked, the common stock reaching as high as 55¼.

A comparison of the range between high and low quotations since the first of the year are given in the table below:

Late Stock Prices

	Jan. 21 Last	Jan. 4 Price	High	Low —1929—
Ajax	10¼	10	11	9½
Falls	6	7	6½	5
Faultless	35	30	35	33
Firestone	234¾	234	250	233
do. 6% pfd.	110	110	110	109½
Fisk	18⅛	15⅞	18¾	15⅝
do. 1st pfd.	78	66	78¼	68½
General	260	279	282	260
do. pfd.	102	100	102	99½
Goodrich	100¼	101	105¾	96
do. pfd.	115	113½	115	113
Goodyear Com.	127¼	128	140¼	122½
do. pr. pfd.	103½	103¾	103⅞	103
Hood	25¾	26	26½	25⅛
India	45½	42	45½	39
Intercontinental	12⅝	11	14¼	11
Kelly Springfield	22	22½	24	21½
do. 1st pfd.	99	98⅝	100	98½
Lee	23	22⅝	25	21⅝
Miller	24⅜	23½	28¾	22½
do. pfd.	81½	79	82	75
Mohawk	61	65½	66	59
do. pfd.	85	—	90½	81
Norwalk	5⅝	5¼	6⅛	5
Seiberling	58	63	65	59½
do. pfd.	106½	107⅞	107⅞	105⅝
U. S. Rubber	51½	46⅝	55¼	42
do. pfd.	89	85¼	92½	81

Kratz Still Head of Falls

George D. Kratz, president of the Falls Rubber Company, Cuyahoga Falls, Ohio, has informed THE RUBBER AGE that the notice of his resignation from his position as head of the Falls Rubber Company, which appeared in the January 10th issue of the magazine, is incorrect. The report came to the magazine with other Akron correspondence and was believed to be accurate. Mr. Kratz states, however, that the report is absolutely untrue, and the apologies of the publishers are accordingly due Mr. Kratz and all readers who may have been misinformed by the item.

General Factory Employes Starting Midnight Shift

WITH production of tires at record levels for all time, the leading rubber manufacturers of the Akron district are operating their plants on a three-shift schedule of 24 hours a day, and the 13 units which comprise Akron's rubber industry is never at rest. This scene of workers of the General Tire & Rubber Company hurrying to take their places at the company's big plant at one o'clock in the morning is typical of the activity that is now universal in the rubber capital.

CATALPO

for

Inner Tubes

Names in the News

SIR PERCIVAL LEA DEWHIRST PERRY, a director of the Firestone Tyre & Rubber Company, Ltd., England, has been named as one of the seven directors of the newly organized Ford Motor Company, Ltd. Of the other directors, three are members of the American Ford organization and three are prominent English business men.

W. P. TER HORST, research chemist of the Rubber Service Laboratories Company, Nitro, W. Va., has resigned his position and is now connected with the laboratories of the United States Rubber Company at Passaic, N. J.

P. W. LITCHFIELD, president of the Goodyear Tire & Rubber Company, has been presented with a ten-year veteran scout badge in recognition of his activities in the Akron Council of the Boy Scouts of America.

DR. H. N. ALYEA, a member of the faculty of the University of Minnesota, was the speaker at the regular monthly meeting of the Akron branch of the American Chemical Society, held on January 9 at the clubhouse of the Firestone Tire & Rubber Company. The subject of his talk was "Chain Reactions and Their Inhibitions."

GENERAL LINCOLN C. ANDREWS, director general of the Rubber Institute, spoke before the Brooklyn Rotary Club at the Hotel Bossert, Brooklyn, N. Y., on January 10. His subject was the improvement of American business conditions, and he cited the Rubber Institute as an example of agreement within an industry for the eradication of abuses.

CLARENCE EBERLE, of the Goodyear Tire & Rubber Company, has been elected commander of the Akron garrison of the Army and Navy Union. He had been paymaster of the garrison for the last three years.

WILLARD L. MORGAN, formerly in charge of latex inner tube research at the Detroit plant of the United States Rubber Company, has resigned in order to organize research work for the Triplex Safety Glass Company of North America, Clifton, N. J.

R. F. DIXON, who has been connected with the Firestone Tire & Rubber Company for several years, has been appointed manager of the firm's branch at Richmond, Va. Mr. Dixon has previously been associated with the B. F. Goodrich Rubber Company and with the Peerless and White motor car companies.

G. HAROLD SMITH, of the Binney & Smith Company, has been appointed to the New York Citizens' Traffic Committee as the sole representative of the miscellaneous chemical products industries. A. P. COBB, of the New Jersey Zinc Company, has been appointed as a representative of the mining industries, and the rubber industry is represented by F. A. SEAMAN, Kelly Springfield Tire Company; A. S. HARDY, Manhattan Rubber Manufacturing Company; C. B. SEGER, United States Rubber Company; and H. V. BRUMLEY, Whiteall-Tatum Company.

SAM S. POOR, sales manager for the New York branch of the General Tire & Rubber Company for several years, has been transferred to the Akron office where he becomes general sales manager of the company. Mr. Poor, in his work in New York, gained a reputation as one of the best known tire men in eastern trade circles.

A. M. OLIVER, for six years in the advertising department of the Goodyear Tire & Rubber Company at Akron, O., specializing in mechanical goods and sole and heel advertising, has resigned to become advertising manager of the Pangborn Corporation, Hagerstown, Md., manufacturers of sand blast and dust collecting machinery. Mr. Oliver, an engineering graduate, has been with Goodyear more than 13 years, acting as special technical representative in the Coeur D'Alene and Joplin mining districts and later having charge of the plant analysis division of the mechanical rubber goods sales department.

A. M. OLIVER

H. T. DUNN, president of the Fisk Rubber Company, returned to Chicopee Falls on January 20 after several weeks at Miami, Fla. FRANK K. ESPENHAIM, vice-president of the company, is still at Naples, Fla., recovering from a recent illness.

WAYNE MURRAY, for the past year general sales manager of the Southern Equipment Company, has been appointed branch manager for the Fisk Rubber Company at San Antonio, Tex. Previous to joining the Southern Equipment Company, Mr. Murray had been with the Fisk organization since 1910, being head of the Fisk Company of Texas with headquarters at San Antonio.

JOHN YOUNG, well known rubber chemist, is now connected with the Rubber Service Laboratories Company, Akron, O., as eastern representative. He will cover New York, New Jersey and the New England states.

THOMAS A. EDISON, accompanied by Mrs. Edison, left Newark, N. J., January 15, bound for his winter home at Fort Myers, Fla., where he will continue his experiments with rubber-producing plants. He plans to remain in the South until May. At his winter home, Mr. Edison has many varieties of latex-bearing plants growing and he expects to make further progress in his experiments with them. During the winter, Mr. Edison will be visited at Fort Myers by HENRY FORD and HARVEY FIRESTONE, who have taken considerable interest in his work.

FREDERICK J. MAYWALD, F. C. S., rubber chemist and technologist, is now located at 301 Hoboken Road, Carlstadt, N. J. His office and laboratory were previously in Belleville, N. J.

F. H. COMEY, vice-president and secretary in charge of factory operations at the Falls Rubber Company, has left that position to become factory manager of the newly reorganized American Tire & Rubber Corporation, Akron, O. Since leaving Yale University in 1915, where he studied chemical engineering, Mr. Comey has devoted his entire time to the rubber industry.

R. B. TRACY has returned to the Henderson Tire & Rubber Company, Columbus, O., as vice-president of the organization. He was formerly connected with the company as eastern sales manager.

W. L. COATES, formerly with the Philadelphia Rubber Works Company, Akron, O., has joined the mechanical department of the Pharis Tire & Rubber Company, Newark, O. He succeeds C. A. RICE, who resigned to take a position with the India Tire & Rubber Company, Mogadore, O.

H. C. HANSON, formerly manager of the truck and bus department of the Fisk Tire Company, Chicopee Falls, Mass., has been appointed head of the newly created car dealer sales department of the company, which will supervise and promote tire sales to dealers of cars using Fisk tires as original equipment. THOMAS B. SUMMERS succeeds Mr. Hanson as manager of the truck and bus department.

W. D. WEED, advertising manager of the Norwalk Tire & Rubber Company, Norwalk, Conn., will return to his office shortly from an extended business trip through Florida.

CHARLES O. BAUGHMAN, secretary of the Swinehart Tire & Rubber Company, was elected president of the Akron Exchange Club at its annual meeting held last month. ROBERT M. PIERSON, former Goodrich attorney, was chosen vice-president.

Rubber News Around the World

ENGLAND TO CONTINUE RUBBER PAVING TESTS

Rubber Roadways, Ltd., Will Lay Four Demonstration Roads of at Least 1,000 Square Yards Each to Prove Value of New Paving.

FURTHER experiments to determine the value of rubber paving blocks for public roads are to be conducted in England as a result of the program drawn up by Rubber Roadways, Ltd., the principal company engaged in developing this new use for rubber. In order to arouse public interest, the company has decided on plans which will result in demonstration roads in different areas with a total area of 4,000 square yards or more.

Under an arrangement which has been placed before important city councils, Rubber Roadways, Ltd., will supply rubber paving blocks and have them laid at a maximum cost to the authorities of 30s, or approximately $7.25 per square yard, with free maintenance for five years. This is less than the cost of granite setts, and the company has offered to accept payment in installments.

Sir Stanley Bois, chairman of the company, made the announcement at the annual meeting and declared that two new tests had been arranged in the past few months. In Thurloe Place, Kensington, 300 square yards were laid in January, 1928, and 150 square yards have been laid in Croydon Road, Penge. There are now five different types of rubber paving blocks under test, and the experiments are said to be progressing without any set-backs.

Test Roadways in Paris and Rotterdam

The interest in rubber paving has also spread to the Continent, and the company has agreed to subsidize tests with various types of Gaisman blocks in Paris. The propaganda department of the International Rubber Growers' Association at The Hague has recently arranged a test of the North British blocks in Rotterdam.

"We claim that rubber possesses unique advantages over other road surfacing materials," Sir Stanley stated, "the principal of which are long life, low maintenance and absorption of noise and vibration. In time I believe rubber paving will prove more economical, but at present authorities are concerned with initial cost, and rubber paving will always be more expensive than wood or granite setts.

"A rubber road must have a surface of exceptional quality to withstand the shearing stresses of modern traffic, and any attempt to sacrifice quality in order to bring down initial cost is to be deprecated; it would do harm to rubber paving to have shoddy material for the surface. The true cost of road paving is determined in relation to initial cost, maintenance and life of the paving. I suggest that rubber will be found to have a low maintenance cost and a long life, and these justify a higher initial cost.

"What that cost will be time will show, but I visualize rubber paving being exploited commercially on a maintenance basis. Once there is a real demand for rubber paving, it is up to producers and manufacturers to meet that demand by formulating some scheme that will enable rubber paving to be supplied on attractive terms to communities."

Dunlop Pays Dividend

The Dunlop Tire & Rubber Goods Co., Ltd., has paid its regular dividend of $1.75 a share on its 7 per cent preferred stock for the last quarter of 1928. This is the 91st dividend of its kind, the company having paid similar quarterly dividends since its establishment on March 1, 1899, without interruption.

Rubber Institution Meetings

At the February meeting of the Scottish section of the Institution of the Rubber Industry, W. G. Martin, F.I.C., F.I.R.I., will read a paper on the subject of "Varnishes for the Rubber Industry." The meeting of the London and District section scheduled for February 4 at the Blackfriars Theatre, London, is planned as a "short papers night." The talks to be given will be by W. F. O. Pollett, B.Sc., on "China Clay as a Compounding Ingredient in Rubber," and by H. F. Church, B.Sc., on "Physical Characteristics of Sponge Rubber."

Sir W. Thiselton-Dyer

Sir William Thiselton-Dyer, director of the Royal Botanic Gardens at Kew, England, from 1885 to 1905, died at his home near Cheltenham on December 16 at the age of 85. He was largely instrumental in germinating the original rubber seeds brought from Brazil to Kew by the late Sir Henry Wickham. This was in 1876, and from the experimental beginnings with which he was closely associated has grown the rubber plantation industry of British Malaya and the Dutch East Indies.

William Dixon Campbell

William Dixon Campbell, chairman of the Rubber Growers' Association for the year 1925-26 and chairman of the Ceylon Association of London, was taken ill suddenly while on his way to the rubber merchandise marking inquiry last month and died before reaching the hospital. He was a constructive member of the council of the Rubber Growers' Association for a number of years, especially in connection with the finance committee.

Mr. Campbell was associated with the firm of Lyall Anderson & Company, of which he was senior partner, and was also chairman and managing director of a number of rubber and tea companies. He was 67 years of age.

GERMANY NOT READY TO SELL SYNTHETIC RUBBER

Announcements from Cologne that negotiations are pending between the Continental Caoutchouc & Guttapercha Company in Hanover and the I. G. Farbenindustrie, the German Dye Trust, relative to placing on the market synthetic rubber produced by the latter, have recently been denied. The German Dye Trust is reported to be testing tires made of synthetic rubber on a Mercedes-Benz car and a Simon-Supra car at the present time.

Recent dispatches from Europe also state that several other countries are now interested in the production of artificial rubber, experiments being conducted in Poland, Belgium, France and Switzerland. J. Baer, of Uster, Switzerland, has applied for patents on a method of producing artificial rubber in which foraldehyde is treated with alkali or alkaline earth polysulphides in solution. The formaldehyde may be mixed with ethylene or methylene dichloride or dibromide. It is clamied that the products resemble rubber.

Australian Company Growing

The business of the North Australian Rubber Mills, Ltd., is reported to be rapidly becoming one of the leading industries of Queensland. The company commenced operations in 1922 and through a period of steady development have pushed the marketing of their well-known brand of "Narm" rubber footwear to the point where it is the leading line throughout Australia.

The plant of the company is located at Kelvin Grove, Brisbane, and is equipped with the latest in modern machinery. A feature of the organization is a well equipped research laboratory conducted by an expert technical staff who are constantly seeking new methods for improving the company's output.

Firestone Buys New Site

The Firestone Tyre & Rubber Company, Ltd., is reported as having purchased from the Middlesex County Council two acres of land on the Great West Road in that section of England. The price of the site is given as £850 per acre.

CATALPO
for
Treads

Rubber Goods and Specialties

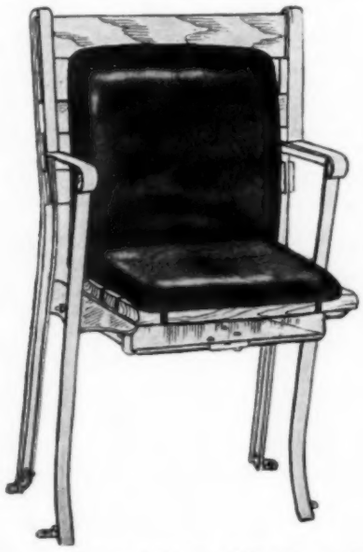
Convertible Zipper

As part of its new 1929 line of Zippers, the B. F. Goodrich Company, Akron, O., is introducing this "convertible" style, which it calls one of the finest overshoes ever designed and an example of the best tailor-

ing obtainable. It is slim fitting and follows the natural foot line. Equipped with a genuine talon fastener, it is furnished in four color blends, Lido sand, turtle, taupe and Maduro brown. Although extemely light in weight, these Zippers are claimed to be most durable. Other styles announced in the Goodrich Zipper line are the Lo-Zipper, the Tweed Lo-Zipper, and the Co-ed.

Cushion Seat Covers

Further steps are being taken by the E-Z-E Cushion Corporation, New York City, to develop the market for its new patented coin controlled container device for vending cushion seats and back rests in



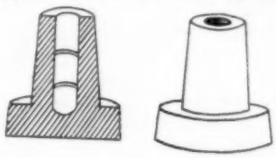
large stadiums and other public places. The cushion itself is made of sponge rubber covered with Pantasote, an imitation leather, and securely attached by airplane wire strands to a weather-proof container made of Cadmium plated steel, enameled, and fitted with a non-pickable coin controlled lock, impervious to weather, dust and rust, and practically indestructible.

Pneumatic Camp Mattress

A one-piece, full-length, light-weight air mattress is now being manufactured by the Airubber department of the New York Rubber Corporation, Beacon, N. Y. This mattress has a light-weight khaki jean, coated on one side with rubber. The material forming the complete mattress is vulcanized under high pressure into one piece, no stitching or cement being used at the seams. The air chambers are used lengthwise in this mattess, and two interchangeable valve caps are furnished, one having a removable pump connection. The new mattress, which is 25 by 75 inches in size and 5½ pounds in weight, can be used for camp, cabin, cottage or sleeping porch.

Stopper for Glass Rods

The R. W. Rhoades Metaline Co., Inc., Long Island City, New York, have recently introduced an improved rubber stopper for holding glass rods which are used for apply-



ing iodine, mercuro-chrome and similar antiseptics. The stopper is attached to the end of the glass rod and facilitates handling. Previous stoppers made for this purpose were without flanges at the top and the bore was smooth. The new type as shown in the illustration has a large flange at the top and ribs in the bore so that the glass rod is firmly held. It is stated that this stopper will accommodate any glass rod between 3 and 4 mm., and that the larger size will not distort the shape of the stopper nor will the smaller size drop out.

Rubber Jar Covers

Tops of soft rubber to fit over jars of preserves or other foodstuffs are now being manufactured to replace the regular paper or tin coverings, which become soiled, bent out of shape or mislaid. These rubber covers are available in many bright colors, and being pliable, they strongly cover any size of jar and do not have to be purchased to measure.

Rubber Stick Eraser

A little rubber stick, which can be applied to silk stockings like an ordinary eraser to remove mud stains, has recently been introduced on the British market. It is said to be equally efficient in cleaning silverware, gloves and other articles. In England it retails for the equivalent of 12 cents, and it is likely to be introduced into the American novelty market in the near future.

Rubber Cushion Heel

Under the name of United "D" heel, the United Shoe Machinery Corporation, Albany Building, Boston, Mass., is maketing a new rubber cushion heel which it claims to be made from the highest class of mater-

ials and capable of giving long wear. It is easily distinguishable by the pattern of the letter "D" employed in its design.

Hollow Rubber Sponge

The newest kind of sponge being offered in England is made of thick hollow rubber with a perforated surface. In addition to its use as a sponge, it may be employed as a spray for shampooing. The rough, perforated sides also make an excellent massager, either for the head or the skin, and it is equally useful to both men and women.

Toy Ice Truck

The Owens Kreiser Company, 45 East 17th street, New York City, is offering as one of the Hercules line of steel toys which it distributes, a miniature ice delivery truck, equipped with rubber ties. The hood of the truck is fashioned after the familiar Mack

Bulldog pattern, and the body is painted in bright and durable colors. Among the other rubber tired motor toys in the same line are express trucks, dump trucks, and oil tank trucks.

Stocking Protector

A small rubber protector has been designed to fit into the back of the shoe as a guard against wearing holes in the heel of the sock or stocking. This reduces the friction caused by the heel coming into contact with the back of the shoe, and, when a hile has been worn, protects the skin against chafing and blistering.

Hot Water Bottles

Rubber hot water bottles are now being manufactured for use with children in a number of new designs. Chief among these are patterns in the shape of favorite animals, such as rabbits, pigs, birds, squirrels and dogs. These bottles are all made to be used without coverings and will not burn the skin.

Current Crude Rubber Items

Malayan Rubber Statistics Expected To Be Continued

With the ending of restriction, the provisions of the Restriction Enactment regarding collection of information concerning cultivation and production of rubber are being transferred to the Rubber Supervision Enactment. The principal section of the Bill published in *F. M. S. Gazette* of October 4, 1928, provides for requiring information as to: (a) The planted acreage of rubber in any holding; (b) the years when planted and the acreage planted each year; (c) the acreage of unplanted land reserved for rubber; (d) stocks of rubber; (e) quantity of rubber produced, sold, or exported; (f) any further matters relating to rubber cultivation.

Malaya Issues Rubber Stock Census

The Malay States Information Bureau in London has received official advice from Kuala Lumpur stating that the result of the census of stocks of rubber within the restriction area as on November 30, 1928, on rubber estates of over 100 acres and dealers' stocks was as follows:

	Estates Tons	*Dealers Tons*
Federated Malay States	24,269	10,395
Straits Settlements	3,267	*1,785
Johore	7,885	1,800
Kedah	†	†
Kelantan	†	†
Trengganu	†	†
	35,421	13,980

*Do not include Penang and Singapore.
†Not available.

Rubber Stocks Rise On London Exchange

There has been a fresh blaze-up of speculative activity in many of the prominent shares on the London Stock Exchange. Rubber shares are in greatly increased demand —a response to the further advance in the spot price of the commodity to 10¼d. per pound. Up to 10¾d. is being quoted for October-December delivery. The lowest spot price last year was 8d. per lb.

Consumption of rubber for 1928 is estimated at 650,000 tons, as against 580,000 tons for 1927, an increase of about 12 per cent. Shipments have expanded from 605,000 tons to about 640,000 tons, but the increase is principally due to the clearing up of the estate accumulation. But for the export of those accumulations the scale of shipments would have been much lower.

Dutch Bankers Disavow Kloppenburg Scheme

Regarding the plan suggested by M. Kloppenburg, a Dutch banker, with a view to improving the rubber position from the producers' viewpoint. the Amsterdam *Telegraaf* declares that leading Dutch rubber circles are not only ignorant of his proposals, but do not look with favor on any change.

The secretary of the Netherlands Rubber Producers' Committee disclaims, it declares, all knowledge of any cooperation in the scheme on the part of his committee, while members of the committee appointed last year to safeguard the interests of Dutch rubber producers, of which M. Burger is a prominent member, are also said to be unwilling to cooperate.

Consequently, adds the *Telegraaf*, it is not clear what M. Kloppenburg's projected American trip is designed to achieve, especially as Americans are known to be opposed to the cooperation of rubber producers. It finally declares that neither the Dutch Government nor Dutch rubber producers will have anything to do with M. Kloppenburg's plans.

M. Kloppenburg says he will attempt to secure American support for the formation of an American-Dutch Rubber Trust Co., the aim of which would be "to make the American consumer and the Dutch producer more independent of the British rubber industry."

Liquid Latex Exports

The final official statistics for British Malaya, 1927, now show exports of liquid latex and concentrated latex by destinations. Exports of concentrated latex amounted to 189 tons for the year, 94 tons to Netherlands, 49 to United Kingdom, 38 to United States, 3 to Germany, and 5 tons to France.

Liquid Latex Exports

	1926 *Gallons*	1927 *Gallons*
Australia	8	88
France	....	5,862
Germany	1,752	4,148
Italy	1,328	2,688
Japan	1,428	3,760
Netherlands	1,733	3,915
United Kingdom	54,894	75,782
United States	2,026,704	1,464,697
	2,087,847	1,560,974

Dutch Native Rubber Production Declines

How much rubber will be produced in Dutch Native rubber districts under a given set of circumstances is one of the most difficult questions confronting rubber economists and statisticians. During February, March, and April, 1928, according to the figures of Department of Commerce, the exports from native areas declined, but this was perhaps the result of marketing difficulties as much as lower production.

This view was supported by the heavier exports which came out in May and June, after the price became settled, and also by the continuance of a satisfactory rate of port in July and August. The exports for September, October, and November have been exceptionally low as compared with past years and seem to indicate that Netherland native rubber output is being seriously curtailed. It now appears that the native production for 1928 (dry weight) will be no more than 80,000 tons, and if the 1929 production were estimated at the rate of exports for September-November 1928, the figure would be only about 73,000 tons.

If a larger percentage of the native rubber is now remilled locally and exported in dry form these estimates might be increased to some extent. The following statistics of monthly exports of rubber from Netherland, India (exclusive of Java and Madura, and Sumatra East Coast) shows the comparative decline in exports during recent months:

Rubber Exports from Other Netherland India

	Wet Weight—Long Tons 1927	1928
January	10,690	11,360
February	10,535	8,635
March	12,905	9,690
April	10,197	5,538
May	13,410	10,382
June	9,109	13,623
July	11,566	11,424
August	12,440	11,798
September	9,853	9,791
October	13,633	9,977
November	14,395	7,805
December	13,438	
Total	142,171	

Closing Prices on Rubber Exchange of New York, Inc.

FROM JANUARY 5 TO JANUARY 21, 1929

Date		Spot	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Sales*
Jan.	5	18.10	17.90	18.00	18.20	18.40	18.60	18.80	18.90	19.00	19.10	19.20	19.30	19.40	144
	7	18.20	18.00	18.10	18.20	18.40	18.60	18.70	18.80	18.90	19.00	19.20	19.30	19.40	104
	8	18.30	18.10	18.20	18.30	18.60	18.80	18.90	18.90	19.00	19.10	19.20	19.40	19.50	270
	9	18.50	18.30	18.30	18.50	18.70	18.90	19.00	19.10	19.20	19.30	19.50	19.70	19.80	1,091
	10	18.40	18.40	18.40	18.70	18.90	19.00	19.20	19.30	19.40	19.50	19.60	19.70	19.70	459
	11	20.00	19.80	19.80	19.90	20.10	20.20	20.50	20.70	20.80	20.80	20.90	21.00	21.00	3,887
	12	21.30	21.00	21.00	21.10	21.30	21.50	21.70	21.90	22.00	22.10	22.20	22.30	22.30	2,255
	14	20.30	20.00	20.10	20.20	20.30	20.50	20.70	20.90	21.10	21.20	21.30	21.50	21.50	2,989
	15	19.80	19.60	19.80	19.80	20.00	20.20	20.30	20.40	20.50	20.50	20.70	20.90	21.00	2,185
	16	20.60	20.40	20.70	20.90	21.20	21.40	21.50	21.50	21.60	21.60	22.00	22.00	22.00	2,642
	17	20.30	20.10	20.10	20.20	20.40	20.60	20.80	20.90	21.00	21.10	21.50	21.50	21.50	1,599
	18	20.20	20.00	20.00	20.20	20.40	20.60	20.80	21.00	21.00	21.10	21.10	21.30	21.40	839
	19	19.90	19.90	20.00	20.10	20.30	20.60	20.70	20.80	20.90	20.90	21.00	21.30	21.30	44
	21	20.40	20.20	20.20	20.30	20.50	20.70	20.80	20.90	21.00	21.20	21.20	21.40	21.50	575

*In lots of 2½ tons each

F. J. LEWIS COMPANY TO OPERATE WITH NEW NAME

The International Combustion Engineering Corporation, New York City, has just announced that its subsidiary, the F. J. Lewis Manufacturing Company, producers of coal tar products since 1887, will henceforth be known as the International Combustion Tar & Chemical Corporation, with offices at 200 Madison avenue, New York City, and 2500 South Robey street, Chicago, Ill.

The new company will continue and extend the activities of the F. J. Lewis Manufacturing Company, producing a complete line of coal tar products, including pitches, solvents and rubber softeners. The products of the new organization will be sold under the brand name of "IN-CE-CO."

Extensions and improvements to manufacturing facilities are now under way. The company's six plants are located at Newark, N. J., Fairmont, W. Va., Dover, O., Chattanooga, Tenn., Granite City, Ill. and Chicago, Ill.

FOOTE BROTHERS OPEN NEW YORK CITY OFFICE

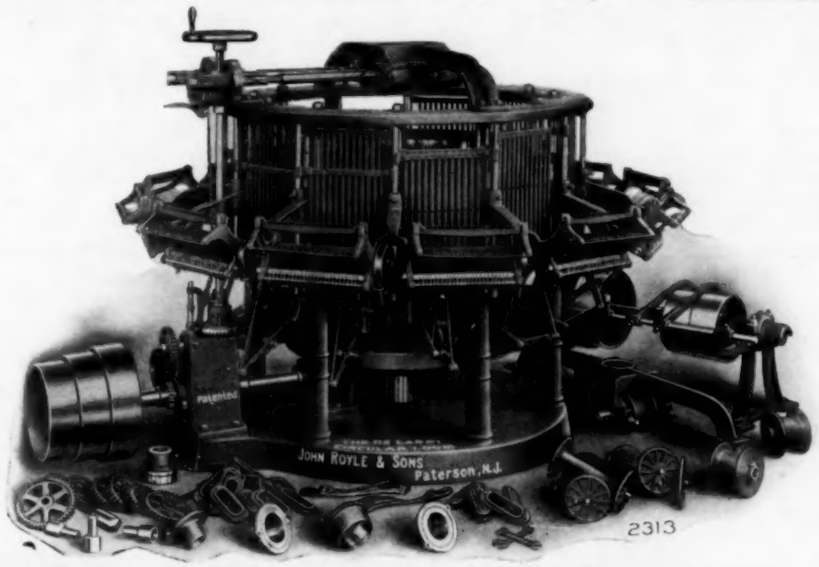
Foote Brothers Gear & Machine Company, Chicago, Ill., have recently established a New York City branch office which will be in charge of E. A. Phillips, who will have his headquarters in the Woolworth Building. This branch will have control of all territory in the New England states, New York as far west as Rochester, and the northern half of New Jersey.

Mr. Phillips has had wide training and experience along engineering lines and the New York office under his direction is expected to be of great assistance to customers of the company in that territory in solving problems on gearing, speed reducers, and transmission equipment. This office will also be in charge of the distributing organization covering the new lines of road and highway equipment manufactured by the four companies in which Foote Brothers have recently acquired interests.

Annual Goodyear Inventory

Annual inventory was taken during the week between Christmas and New Year's in a number of the departments of the Goodyear Tire & Rubber Company at Akron. William C. Stephens, general superintendent, said that the mechanical goods department had been closed down during the full week and that the tire department was shut down from December 29 to January 1. All departments reopened in full on January 2.

The new plant of the Wooster Rubber Company at Wooster, O., was recently completed and is entirely ready for occupancy. Machinery is being moved into the new structure on East Bowman Street, and production there is expected to start shortly.



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LABOR DISPUTE SETTLED AT GOODYEAR'S HANGAR

Work was resumed on December 19 on the foundation for the Goodyear-Zeppelin Corporation dirigible hangar at Akron after 21 employes of the McArthur Construction Company of New York City, ended a walk-out that had lasted a day and a half. According to officials, the men walked out because the Clemmer-Noah Company of Akron was using non-union labor on its share of the job.

The McArthur company immediately communicated with labor union headquarters at Indianapolis, where it was decided that no attempt should be made to penalize the McArthur organization because another contractor on the same job was operating on an open shop basis. Labor headquarters ordered the McArthur men back on the job and told them to proceed only by methods of persuasion if they wished to attempt to unionize the Clemmer-Noah forces.

PIONEER RUBBER COMPANY BUILDING NEW STRUCTURE

The Pioneer Rubber Company, which operates factories at Willard, O., and Attica, O., is building a new structure at its Willard plant. The new building will be 20 by 66 feet in size and will be located between the two present units of the factory.

Increases in business have made the enlargement of the Willard plant a necessity. According to officials of the company, it is a peculiar fact that the climate of Huron county seems particularly adapted to the manufacture of toy balloons, surgeons' gloves, and similar products.

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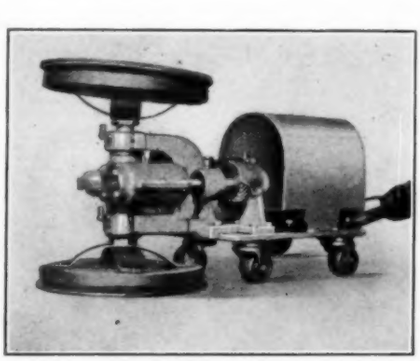

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LATE MARKET PRICES

Crude, Scrap & Reclaimed Rubber - Cottons and Fabrics

NEW YORK, JANUARY 22, 1929

COTTON

THE cotton market remains slow but firm at around 20 cents, which is but a slight increase from the figures of a fortnight ago. The last week has shown a slight improvement in the demand, probably stimulated by optimistic views has to the future trend in spite of the fact that the world's visible supply of cotton at the present writing is reported to be in excess of the total at this time last year. Large exports have also served to hold the market up. The present state of the market suggests a gradual but not a rapid advance up to the receipt of news of the next crop movement.

Current high, low and closing prices are as follows:

	High	Low Jan. 22	Close	Close Jan. 4
January	20.19	20.10	20.15	19.78
March	20.25	20.15	20.16	19.84
May	20.25	20.14	20.15	19.88

Tire Fabrics

The market for tire fabrics has been low and prices have remained as reported two weeks ago. Tire plants apparently have satisfied their requirements for the time being and demand has disappeared although some contracts have been reported calling for deliveries in the second half of the year. Tire fabric mills, however, are reported to be not sold ahead for more than 60 days.

Late prices follow:

CORD				
Peeler, carded, 23/5/3	lb.	.47	@	.48
Peeler, carded, 23/4/3	lb.	.48	@	.49
Peeler, carded, 13/3/3	lb.	.44	@	.45
Peeler, carded, 15/3/3	lb.	.44½	@	.45½
Egyptian, carded, 23/5/3	lb.	.54	@	.55
Egyptian, combed, 23/5/3	lb.	.59	@	.59½
CHAFERS				
Carded, American, 8 oz.	lb.	.39½	@	.41
Carded, American, 10 oz.	lb.	.40	@	.41
Carded, American, 12 oz.	lb.	.40	@	.43
Carded, American, 14 oz.	lb.	.39	@	.43
LENO BREAKER				
Carded American, 8¼ oz.	lb.	.40	@	.44
Carded American, 10¼ oz.	lb.	.40	@	.44
SQUARE WOVEN				
Carded American, 17¼ oz. 23-11 ply	lb.	.47		
Carded American, 17¼ oz. 10-ply	lb.	.40	@	.41

Sheetings

There have been reports of several large orders for sheetings in the 40-inch constructions, but for the most part the market has been quiet and as in the case of tire fabrics, the factories seem to have acquired all the immediate requirements needed. Prices have remained fairly firm in spite of the lack of interest, but such sales as are being made are reported at figures slightly off from those quoted. Latest prices are reported as follows:

40-inch, 2.50-yard	yd.	.12¾	@	.12⅞
40-inch, 2.85-yard	yd.	.11⅛	@	.11¼
40-inch, 3.15-yard	yd.		@	.12
40-inch, 3.60-yard	yd.	.09⅞	@	.10
40-inch, 3.75-yard	yd.	.08½	@	.08⅝
40-inch, 4.25-yard	yd.	.07⅝	@	.07¾

Ducks

The market in enameling ducks has continued to show some improvement over the past fortnight and prices have remained firm. The demand is confined to ducks for sportwear for the summer trade. Rubberizers have apparently filled their present requirements in other grades.

Belting and Hose	lb.		@	.37½
Enameling	lb.	.36	@	.38
Single filling	lb.	.14¾	@	.17½
Double filling	lb.	.17½	@	.18½

RECLAIMED RUBBER

The market in reclaimed rubber remains active and stimulated by the slight advance in crude rubber prices the quotations on reclaimed have remained unchanged. Reclaiming plants report practically no recession of orders even in the face of the expected seasonal decline in rubber goods manufacture and the usual dull season just prior to inventory taking. On the other hand shipments are reported going forward on new contracts, indicating that production schedules of the tire and other rubber manufacturing plants represent no curtailment during the coming months. Late prices follow:

Super-Reclaim No. 1 Black	lb.	.12	@	.12½
Super-Reclaim No. 2 Black	lb.	.11	@	.11¼
High Tensile Red	lb.	.12½	@	.13
Shoe				
Unwashed	lb.	.07¼	@	.07½
Washed	lb.	.10	@	.10¼
Tube				
No. 1 (Floating)	lb.	.13½	@	.14
No. 2 (compounded)	lb.	.10½	@	.11
Tires				
Black, washed		.09½	@	.10
Black, unwashed		.07½	@	.07⅝
Black selected tires	lb.	.08	@	.08¼
Dark Gray	lb.	.09½	@	.09¾
Light Gray	lb.	.12	@	.12½
White	lb.	.13	@	.13½
Truck, Heavy Gravity	lb.	.07	@	.07¼
Truck, Light Gravity	lb.	.07½	@	.07¾
Miscellaneous				
Mechanical Blends	lb.	.06¾	@	.07½
Red	lb.	.12½	@	.13

Scrap Rubber

Demand for scrap continues satisfactory and prices have remained unchanged during the fortnight. Collections are reported more difficult due largely to the bad weather, but accumulations are being moved rapidly on the demand from reclaiming factories. With the slight advance in crude rubber and the demand for reclaim still holding up there is little probability of any decline in scrap prices. Latest prices follow:

(Prices to Consumer)

Auto tire peelings	ton	39.00	@	42.50
Standard White auto	ton	47.50	@	50.00
Mixed auto	ton	24.50	@	25.00
Bicycle tires	ton	20.00	@	22.50
Clean solid truck tires	ton	22.00	@	24.00
Boots and shoes	cwt.	1.40	@	1.55
Arctics, untrimmed	lb.	.00¾	@	.00⅞
Inner tubes, No. 1	lb.	.06½	@	.06¾
Inner tubes, No. 2, compounded	cwt.	4.25	@	4.30
Inner Tubes, Red	lb.	.05¼	@	.05⅝
Air Brake Hose	ton	34.00	@	35.00
Rubber Hose	ton	17.50	@	20.00

CRUDE RUBBER

IN the light of a sudden and heavy demand and strong speculative buying in London last week the crude rubber market took a violent jump from the range of prices as quoted a fortnight ago. There have been some recessions from the highest levels but on the whole the entire list has advanced. The demand in London soon had its effect on the domestic market with a consequence that the Exchange and outside traders were deluged with orders. All records on the Exchange were broken on January 10, when 3,887 contracts were handled aggregating 9,717½ tons of rubber and valued at $4,373,000.

The reaction from last week has brought about considerable profit taking under pressure, but the general statistical position of rubber remains good and the trade in general look for further activity with a probable slight rise. The period of dullness in the market has apparently passed and with it the delusion that the additional heavy shipments of accumulated stocks from the Far East would depress the market.

The December figures from the Rubber Association of America while showing an expected seasonal decline in December consumption of rubber bring the total figures for the year up to 441,421 tons, which is well above any previous record in the history of the industry.

Stocks on hand in the United States showed a slight advance together with stocks in London, but the increase is not out of line with the continued high consumption.

Prices on the New York outside market on January 22, were as follows:

Plantations—			
Ribbed Smoked Sheets—			
Spot Jan.	.20⅛	@	.20⅜
Feb.	.20⅛	@	.20⅜
Apr.-June	.20¾	@	.21
July-Sept.	.21	@	.21¼
First Latex, crepe spot	.20½	@	.20¾
Amber Crepe, No. 2	.18⅝	@	.18⅞
Amber Crepe, No. 3	.18⅜	@	.18⅝
Amber Crepe, No. 4	.18⅛	@	.18⅜
Brown Crepe, Rolled	.15	@	.15¼
Brown Crepe, Clean, thin	.18½	@	.18¾
Brown Crepe, specky	.18¼	@	.18⅜
Liquid Latex, per gal.	1.00		
Paras—			
Up-river Fine	.21¼	@	.21½
Up-river Medium	Nominal		
Up-river Coarse	.14¼	@	.14½
Acre Bolivian, fine	.22	@	.22¼
Caucho Ball, Upper	.13¾	@	.14
Islands, fine	Nominal		
Centrals—			
Central, scrap	.12	@	.12½
Esmeraldas	.12	@	.12½
Balata—			
Block, Colombia	Nominal		
Block, Cuidad	.50	@	—

LONDON MARKET

Standard Ribbed Smoked Sheets—Buyers			
Spot-Feb.	10d	@	10⅛d
Mar.-June	10⅛	@	10¼d

SINGAPORE MARKET

Standard Ribbed Smoked Sheets—Sellers			
Spot		@	9⅞d

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SUPERFINE
99½%

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"TUBE" BRAND
VELVET
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LATE RUBBER CHEMICAL PRICES

Accelerators — Colors — Softeners — Compounding Materials

NEW YORK, JANUARY 22, 1929

DESPITE the seasonal decline in production and the annual inventory period throughout the rubber manufacturing industry the chemical suppliers report no apparent slowing up in orders for compounding materials and other rubber chemicals. There has been a slight decline in prices for certain accelerators but for the most part the list has remained without change over the past fortnight. The active demand for several of the more important materials, especially Lithopone and Stearic Acid has lead to the placing of large orders which are already taxing the 1929 capacity of manufacturers. Manufacturers of carbon black report an especially active market with the prospect that the plants will run to capacity in spite of the additional production which is expected from the many new plants erected during the course of 1928 or are now in the process of building.

ACCELERATORS

Organic			
A-7	lb.	.55 @	.59
A-11	lb.	.62 @	.66
A-16	lb.	.57 @	.61
A-19	lb.	.58 @	.62
A-20	lb.	.64 @	.68
Aero-X	lb.	.75 @	—
Aldehyde ammonia, crystals	lb.	.65 @	.70
Aniline oil, drums, f.o.b. works	lb.	.15 @	.16¼
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolylguanidine	lb.	.42 @	.52
Diphenylguanidine	lb.	.30 @	.36
Ethylidene aniline	lb.	.45 @	.47½
Formaldehyde Aniline	lb.	.34 @	.44
Grasselerator 102	lb.	.62½@	.63½
Grasselerator 552	lb.	— @	4.45
Grasselerator 808	lb.	.80 @	.85
Grasselerator 833	lb.	1.17 @	1.30
Heptene	lb.	.40 @	—
Hexamethylene-tetramine	lb.	.62½@	.65
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.35 @	.45
Monex	lb.	3.25 @	—
Oynone	lb.	.68 @	.80
Para-Nitrosodimethylaniline, f.o.b. works	lb.	.92 @	.96
Piperidine-Piperidyldithio-Carbamate	lb.	4.45 @	4.60
R & H 40	lb.	.40 @	.42½
R & H 50	lb.	.40 @	.42½
R & H 397	lb.	.75 @	.77½
Safex	lb.	1.20 @	1.25
Tensilac, No. 39	lb.	.50 @	.52½
Tensilac, No. 41	lb.	.50 @	.52½
Thermic F	lb.	.50 @	.55
Thiocarbanilide, drums	lb.	.26½@	.28½
Thionex	lb.		
Trimene	lb.	.75 @	—
base	lb.	1.20 @	—
Triphenylguanidine	lb.	.59 @	.62½
Vulcanex	lb.		
Vulcone	lb.		
Vulcanol	lb.		
Waxene	lb.	.30 @	.32
Z 88	lb.	.65 @	.69
Inorganic			
Lead, sublimed blue	lb.	.07¾@	—
Lead, white	lb.	.10½@	.12½
Litharge, domestic	lb.	.09 @	—
Magnesia, calcined, light	per 100 lb.	5.35 @	5.45
heavy	per 100 lb.	3.65 @	3.75

COLORS

Blacks (See Compounding Materials)			
Blues			
Prussian	lb.	.32 @	.35
Ultramarine	lb.	.06 @	.30
Browns			
Sienna, Italian	lb.	.05½@	.12½
Umber, Turkey	lb.	.04½@	.07
Greens			
Chrome, light	lb.	.27 @	.31
medium	lb.	.29 @	.32
dark	lb.	.31 @	.34
Chromium Oxide, bbl.	lb.	.34 @	.36
Reds			
Antimony crimson, 15/17	lb.	.44 @	.50
sulphur free	lb.	.50 @	.55
golden 15/17 F.S.	lb.	.20 @	.25
Indian English	lb.	.08 @	.12
Domestic (Maroon)	lb.	.08 @	.12
Oximony	lb.	.13¼@	—
Red oxide, pure	lb.	.10 @	.12
Venetian red	lb.	.03 @	.06
Vermillion, quicksilver, English	lb.	1.88 @	1.95
Whites			
Lithopone, Akcolith	lb.	.05 3/5@	.06
Lithopone, Azolith	lb.	.05¼@	.05¾
Lithopone, Vanolith	lb.	.05¾@	—
Titanox	lb.	.09½@	.10
Cal. Base Pigment	lb.	.10 @	.10½
Zinc Oxide—American Process			
American Azo:			
ZZZ (lead free)	lb.	.06½@	.07
ZZ (leaded)	lb.	.06⅝@	.06⅞
Zinc Oxide—French Process			
White seal	lb.	.11⅜@	—
Green seal	lb.	.10⅞@	—
Red Seal		.09⅞@	—
Yellows			
Chrome	lb.	.15½@	.16½
Ocher, French medium	lb.	.03½@	.06
domestic	lb.	.01⅝@	.02

COMPOUNDING MATERIALS

Aluminum Flake	ton	21.85 @	24.50
Ammonia carbonate	lb.	.10½@	.12
Asbestine	ton	14.75 @	18.00
Barium carbonate	lb.	.03½@	.05
Barium Dust	lb.	.05 @	.06
Barytes southern off-color,	ton	12.00 @	18.00
Western prime white	ton	25.00 @	—
imported	ton	27.00 @	36.00
Basofor	lb.	.04½@	—
Blacks			
Arrow "Aerfloted"	lb.	.08½@	.12½
Bone Black	lb.	.05½@	.11
Carbon, compressed	lb.	.08 @	.12
Carbon, uncompressed	lb.	.07½@	.11½
Drop Black	lb.	.06 @	.10
Fumonex	lb.	.06 @	.09
Gastex	lb.	.05¼@	.05½
Lamp Black	lb.	.12 @	.40
Micronex	lb.	.08½@	.12½
Velvetex carbon	lb.	.04½@	.06
Blanc fixe dry f.o.b. works	lb.	.03½@	.03⅝
Carrara filler	lb.	.01¾@	.02
Catalpo (fact.)	lb.	.02 @	—
Chalk	ton	12.00 @	14.00
Clay, China, domestic	ton	8.00 @	9.00
Aerfloted Suprex	ton	10.00 @	22.00
Congaree, c. l. f.o.b. mine	ton	9.00 @	—
Mineral Flour, c. l. fob mine	ton	20.00 @	23.00
Tensulite		15.00 @	—
Glues, extra white	lb.	.22 @	.26
medium white	lb.	.20 @	.24
Magnesia, carbonate	lb.	.08¾@	.11
Mica, powdered	ton	65.00 @	80.00
Rotten Stone (powdered)	lb.	.02½@	.04½
Soapstone, powdered	ton	15.00 @	22.00
Starch, powdered	cwt.	3.30 @	3.70
Talc, domestic	ton	12.00 @	15.00
Whiting, commercial	cwt.	.85 @	1.00
English cliffstone	cwt.	1.50 @	—
Superfine	ton	10.00 @	12.00
Witco	ton	12.00 @	—
Wood pulp XXX	ton	45.00 @	—
Wood pulp X	ton	25.00 @	—
Zinc Carbonate	lb.	.09½@	.10½
Zinc Stearate	lb.	.24 @	.25

MINERAL RUBBER

Genasco (factory)	ton	50.00 @	52.00
Montezuma, solid	ton	28.00 @	36.00
Montezuma, granulated	ton	32.00 @	42.00
Paradura	ton	62.50 @	65.00
Pioneer, MR, solid	ton	42.00 @	45.00
Pioneer-granulated	ton	52.00 @	55.00
R & H Hydro-Carbon	ton	27.05 @	29.00
Robertson, MR, solid	ton	34.00 @	80.00
M.R. (gran)	ton	38.00 @	80.00

SOFTENERS

Acids			
Nitric, 36 degrees	cwt.	5.00 @	5.25
Sulphuric, 60 degrees	ton	10.50 @	11.50
66 degrees	ton	15.00 @	16.00
Tartaric, crystals	lb.	.37 @	.38
Acids, Fatty			
Stearex	lb.	.15 @	.20
Stearic, double pressed	lb.	.18 @	.22
Alkalies			
Caustic soda, 76%	cwt.	3.76 @	3.91
Soda ash, 58% C.L.	cwt.	1.40 @	
Oils			
Corn, refined, bbls.	lb.	.11 @	.11½
Cottonseed, crude		.08½@	.08¾
Cycline	gal.	.27 @	.34
Degras (c.l. 100 bbls.)	lb.	.03¾@	—
Less c. l. (10-25 bbls.)	lb.	.04 @	—
Lots less than 10 bbls.	lb.	.04¼@	.04½
Fluxrite	lb.	.05 @	.06
Hexalin	lb.	.60 @	—
Acetate	lb.	.70 @	—
Linseed, Raw C.L. bbl.	lb.	.09½@	.10
Palm Lagos	lb.	.07¼@	.07½
Niger	lb.	.07¾@	.08
Vansulol	lb.	.10½@	—
Para-Flux	gal.	.17 @	—
Peanut, domestic, crude	lb.	.12 @	.12½
Petrolatum, white	lb.	.08 @	.08½
dark amber	lb.	.03¾@	.03¾
Pine, steam distilled	gal.	.65 @	.70
Rapeseed, refined	gal.	1.04 @	1.06
second rectified	gal.	.58 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.06½@	.07½
coal tar	gal.	.05½@	.06
pine, 200 lb. gr. wt.	bbl.	9.00 @	10.00
Rosin, grade K, 280 lb.	bbl.	8.55 @	—
Pigmentar	gal.	.33 @	.41
Solvenol, drums	gal.	.48 @	.50
Tarol, drums	gal.	.30 @	.35
Tar Retort, 50 gal.	bbl.	12.50 @	13.00
Solvents			
Acetone, pure	lb.	.13 @	
Alcohol denatured, No. 1 bbls.	gal.	.37½@	.44½
Benzol, 90%	gal.	.28 @	—
Carbon bisulphide	lb.	.05½@	.06¼
Carbon tetrachloride	lb.	.06¼@	.07
Motor gasoline, steel bbls.	gal.	.17 @	—
Naptha, solvent	gal.	.35 @	.40
Turpentine, spirits	gal.	.60 @	.64
wood	gal.	.50 @	.54
Waxes			
Beeswax	lb.	.56 @	.58
Carnauba	lb.	.33 @	—
Ceresin, white	lb.	.10 @	.11
Montan, crude	lb.	.07 @	.07½
Ozokerite, black	lb.	.24 @	.25
green	lb.	.26 @	.30
Miscellaneous			
RSL Mold Solution	gal.	.75 @	1.00

ANTI-OXIDANTS

Antox	lb.	.79 @	.83
Neozone	lb.		
Oxynone	lb.	.68 @	.80
Resistox	lb.	.54 @	.57
Stabilite	lb.	.65 @	—
VGB	lb.	.55 @	.66

SUBSTITUTES

Black	lb.	.08 @	.14
White	lb.	.10 @	.16
Brown	lb.	.08 @	.15

VULCANIZING INGREDIENTS

Sulphur Chloride (drums)	lb.	.03¼@	.03½
Sulphur flour, Refined, 100% pure (bags)	cwt.	2.40 @	2.75
Commercial (bags)	cwt.	1.75 @	2.10

TIRES & TUBES
CRUDE RUBBER

STATISTICAL SECTION

AUTOMOBILES
GASOLINE

IT HAS been possible by this time to complete the yearly totals on many of the statistical tables in this section. While the final official figures on imports and re-exports are not available, the tentative total of the domestic consumption of crude rubber as published by the Rubber Association of America and brought up to represent 100 per cent shows the astounding figure for the year of 441,340 tons, exceeding the best year of the industry by nearly 60,000 tons.

Imports continue to be comparatively heavy from the Far East but during December were not much out of line with consumption, the latter figure totaling 31,232 tons as against arrivals estimated at 46,840 tons. The decline in December consumption was fully expected with the usual seasonal drop in production.

Stocks on hand and afloat to the United States increased slightly as a consequence of the lower consumption and large arrivals. At the close of the year the total figure for such stocks reached 134,930 tons. London stocks appear to be again on the upgrade but the weekly increases have been slight. Stocks also showed a gain in Singapore and Penang.

Tire production fell off as was expected but the rate of output is still high. Total December figures are not yet available, but the total for the year will well exceed any previous record.

Automobile production for the year shows another record broken. The increase in Canadian production is especially marked.

PLAN OF THE SECTION

The statistics included in this section have been chosen for their constant importance to the rubber industry. The tables are reprinted in the same relative position in every issue, each table being kept current by the addition of new figures as soon as they become available. The section accordingly affords the most up-to-date, complete and convenient statistical service in the industry.

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U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1921	185,394	73,772,677	17.76	5,716	2,414,924	18.86	179,678
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,144	185,060,304	26.72	8,772	5,672,319	28.87	300,372
1924	328,056	174,231,331	23.71	10,309	6,057,637	26.23	317,747
1925	396,642	429,705,014	48.36	14,827	19,847,753	59.76	381,815
1926	413,338	505,817,807	54.63	17,671	22,470,583	56.77	395,667
1927	426,258	389,874,774	35.60	27,775	24,735,488	39.76	398,483
1926:							
Jan.	42,404	72,528,151	76.36	2,059	3,747,505	81.24	40,345
Feb.	32,865	58,733,370	79.78	1,430	2,280,168	71.17	31,435
Mar.	42,152	70,589,581	74.76	1,836	2,735,234	66.51	40,316
Apr.	34,544	48,742,539	62.99	1,128	1,605,093	63.58	33,416
May	29,756	36,896,080	55.35	1,052	1,558,987	66.17	28,704
June	24,900	34,498,561	61.85	1,105	1,371,217	55.41	23,795
July	35,820	33,061,281	41.20	1,554	1,743,854	50.09	34,266
Aug.	27,400	24,670,752	40.21	1,318	1,339,563	45.38	26,082
Sept.	37,112	32,625,032	39.25	1,437	1,519,870	47.20	35,675
Oct.	29,746	25,320,558	38.49	1,366	1,316,270	43.03	28,110
Nov.	39,155	34,890,536	39.78	1,482	1,411,517	42.51	37,673
Dec.	37,754	33,261,366	39.33	1,904	1,841,305	43.16	35,850
1927:							
Jan.	43,340	36,753,719	37.86	1,525	1,444,734	42.28	41,815
Feb.	28,337	23,110,257	36.41	2,451	2,277,297	41.47	25,886
Mar.	35,515	28,693,016	36.07	2,763	3,249,665	52.50	32,752
Apr.	46,202	37,321,505	36.06	1,575	1,428,425	40.48	44,627
May	36,518	30,984,377	37.88	2,782	2,501,562	40.14	33,736
June	33,045	27,850,014	37.62	1,775	1,550,592	39.06	31,270
July	37,677	31,678,259	37.53	1,958	1,560,853	35.59	35,719
Aug.	32,810	26,396,931	35.92	1,809	1,382,768	34.12	31,001
Sept.	33,301	25,314,412	33.94	3,500	3,036,929	38.74	29,801
Oct.	30,184	22,163,282	32.78	2,513	2,042,713	36.29	27,671
Nov.	38,592	27,395,428	31.69	2,469	2,014,196	36.43	36,123
Dec.	30,737	22,213,574	32.26	2,655	2,245,754	37.77	28,082
1928:							
Jan.	39,107	30,278,444	34.56	1,988	1,734,990	38.95	37,119
Feb.	33,663	27,763,655	36.82	2,738	2,229,589	36.35	30,925
Mar.	40,611	32,103,042	35.29	3,718	2,587,435	31.07	36,893
Apr.	37,935	27,287,266	32.11	2,272	1,415,024	27.80	35,663
May	31,059	19,058,672	27.39	2,399	1,386,307	25.80	28,660
June	27,765	14,121,219	22.71	2,621	1,400,697	23.86	25,144
July	31,258	14,144,765	20.20	3,087	1,451,446	20.99	28,171
Aug.	31,204	12,860,150	18.39	2,377	1,084,646	20.37	28,827
Sept.	39,835	16,512,019	18.50	3,038	1,384,148	20.34	36,797
Oct.	44,058	18,200,332	18.44	2,405	1,085,407	20.15	41,653
Nov.	36,519	14,878,441	18.19	2,788	1,207,089	18.52	33,731
Dec.*	38,539	15,675,197	18.16				

*Official estimates based on arrivals at New York and Boston.

U. S. Consumption of Crude Rubber

(Rubber Association of America statistics raised to 100 per cent—All figures in long tons)

Figures on Monthly Basis

	1921	1922	1923	1924	1925	1926	1927	1928
Jan.	5,045	16,938	30,106	29,058	29,638	32,196	31,518	34,403
Feb.	5,955	14,767	30,149	25,736	29,761	31,136	30,137	33,702
Mar.	9,190	21,408	36,629	28,385	33,498	32,936	36,141	35,688
Apr.	13,084	19,294	29,085	27,129	34,139	32,696	35,871	32,772
May	16,023	23,246	36,155	25,845	35,322	29,364	34,592	37,333
June	16,142	31,713	24,272	22,753	35,822	28,598	33,801	37,676
July	18,310	24,522	17,685	23,396	36,053	27,577	29,219	37,497
Aug.	23,649	29,631	20,359	28,982	35,909	34,533	33,460	42,927
Sept.	16,705	24,410	17,594	31,497	31,691	32,904	27,214	39,882
Oct.	16,814	26,881	21,321	31,520	29,047	29,836	26,790	40,857
Nov.	14,105	24,950	20,437	27,289	28,853	28,080	26,792	37,461
Dec.	15,482	25,070	21,902	27,199	28,748	26,293	25,492	31,232
Totals	170,504	282,560	305,694	328,769	388,481	366,149	371,027	441,340

Figures on Quarterly Basis

Quarter	1921	1922	1923	1924	1925	1926	1927	1928
Jan./Mar.			96,776	87,609	95,263	94,301	99,216	103,558
Apr./June	65,463	127,360	89,493	75,674	104,099	87,109	103,242	103,500
July/Sept.			55,621	83,813	99,493	93,793	89,210	117,573
Oct./Dec.	105,962	155,067	63,617	92,656	85,789	83,212	80,860	
Totals	171,425	282,427	305,507	339,752	384,644	358,415	372,528	324,631

Note—The Rubber Association estimates its monthly rubber consumption figures to be 90 per cent complete. Up until 1925 the quarterly figures were likewise estimated to be 90 per cent complete; beginning with 1925 an estimate of 92 per cent completeness has been used. These estimates have been used in raising the figures in this table to 100 per cent. The quarterly figures are generally regarded as the most authentic; the monthly figures may be accepted as preliminary.

Rubber Invoiced to the U. S.

(Reported by American Consuls—Quantities in Long Tons)

During the Week Ended	From Br. Malaya	From Ceylon	From Dutch East Indies	From London & Liverpool	Total
Oct. 27	2,784	981	2,358	788	6,911
Nov. 3	6,097	1,121	3,402	1,130	11,750
Nov. 10	11,137	1,257	2,161	319	14,874
Nov. 17	11,171	1,557	1,573	533	14,834
Nov. 24	13,920	935	1,911	363	17,129
Dec. 1	10,731	1,265	2,624	963	15,583
Dec. 8	10,061	1,443	1,694	17	13,215
Dec. 15	9,785	1,661	2,215	330	13,991
Dec. 22	10,697	1,766	1,642	96	14,201
Dec. 29	8,613	577	2,197	8	11,395
Jan. 5	10,035	1,479	1,608	15	13,137
Jan. 12	9,075	1,628	1,807	299	12,809
Jan. 19	9,469	1,231	2,152	211	13,063

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1926																																
April	59		59		59	58	56½	56½	53	53	51½	50½	49¾	49¾	47½	48½	47	47½	47½	48½	48	49	48	48½	46	46	48	49	48½		51¼
May	48½		50	50¼	49¾	49¾	49½	49½	49	49	49	48	47¾	47¾	47½	47	47	47½	47½	47½	47½	46¾	46	46	46	45	46	46	46	46½		47¾
June	41½		41½	42	41½	41½	41½	42	42	42	42	41½	41½	41½	41½	41½	43	43	43	44	44	44	44	43	43	43	43	42	42		42½
July	42		42	42	42	41½	41½	41½	41¾	42	41¾	41½	41½	41½	41½	41½	41½	40	40	41½	39½	39½	41	41½	41½	41½	41½	41½	42	39½	40	41
August	42		43	43	42	41½	41½	41½	41¾	42	41¾	41½	41½	41½	41½	41½	41½	41½	41½	41½	39½	39½	41	41½	41½	41½	41½	41½	42	39½	40	41
September	40¼		40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40¾	40½	40½	40½	40½	40½	40¾	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	42½	42½	42½	42½
October	43		43	43¾	43¾	42¾	42¾	42½	42½	42¾	42¾	42¾	42¾	42¾	42¾	42¾	43	42¾	42¾	42¾	42¾	42¾	42¾	42¾	42¾	42¾	42¾	42¾	42¾	42¾	42¾	42¾
November	41¼		41	41¼	41¼	41¼	41½	41½	41½	42¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾	41¾
December	36¾		37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½
1927																																
January			37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½
February			37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½
March			41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼	41¼
April			41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½	41½
May			40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½
June	40¾		40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½
July	35½		35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½
August	35½		35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½
Sept.	34		33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾
Oct.	33¾		33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾
Nov.	35		35½	35½	35½	35½	35½	35½	35½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½
Dec.	40½		40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½
1928																																
January			41¼	41¼	41¼	41¼	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
February	37½		37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½
March	39¾		40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
April	41¼		41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
May	40½		40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½
June	40½		40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½
July	35½		35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½
August	35½		35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½	35½
Sept.	34		33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾
Oct.	33¾		33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾	33¾
Nov.	35		35½	35½	35½	35½	35½	35½	35½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½
Dec.	40½		40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½	40½
1929																																
January			41¼	41¼	41¼	41¼	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
February	37½		37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½	37½
March	29		28½	28½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½	27½
April			17½	17½	18½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½
May			19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½
June			18½	18½	18½	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
July			19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½
August			19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½
September			19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½	19½
October	18½		18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½
November	18½		18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½
December	17½		—	17½	17½	17½	17½	17½	17½	17½	17½	17½	17½	17½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½	18½
1930																																
January	—		18½	18½	18½	18½	—	18½	18½	18½	18½	20	—	20	20	20	20	20	20	20	20½	20½	20½	20½	20½	20½	20½	20½	20½	20½	20½	20½

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1910-1921

Year	Cents	Year	Cents	Year	Cents
1910	206.60	1914	65.33	1918	60.15
1911	141.30	1915	65.85	1919	48.70
1912	121.60	1916	72.50	1920	36.30
1913	82.04	1917	72.23	1921	16.36

Average Monthly Price per Pound Since 1922

Months	1922 Cents	1923 Cents	1924 Cents	1925 Cents	1926 Cents	1927 Cents	1928 Cents
Jan.	18.82	32.73	25.86	36.71	79.50	38.75	40.25
Feb.	16.12	35.14	25.29	36.01	62.25	38.25	32.75
Mar.	14.53	34.21	22.83	41.00	59.00	41.04	26.82
Apr.	15.99	32.48	22.51	43.64	51.25	40.86	18.97
May	15.25	27.39	18.89	58.47	47.75	40.76	18.99
June	15.11	26.88	18.81	77.26	42.50	37.25	19.50
July	14.67	26.10	22.16	103.16	41.03	23.44	19.40
Aug.	13.93	28.84	26.17	82.99	38.50	35.12	19.46
Sept.	14.44	28.95	27.56	88.88	41.00	33.67	18.47
Oct.	19.78	26.93	31.13	98.01	42.50	34.32	18.83
Nov.	23.88	27.14	34.33	104.80	38.50	37.58	18.26
Dec.	27.42	26.60	37.88	98.51	38.25	40.63	17.97
Average for Year	17.50	29.45	26.20	72.46	48.50	37.72	22.48

London Closing Prices of Ribbed Smoked Sheet

(In Pence Per Pound)

Day	Oct.	Nov.	Dec.	Jan.	Day	Oct.	Nov.	Dec.	Jan.
1	8½	8⅞	8½	—	17	8⅞	8⅜	8½	10¼
2	8⅝	8⅞	—	8⅝	18	9	—	8⅝	10⅛
3	8½	8⅞	8½	8⅝	19	8⅞	8½	8⅝	10⅛
4	8½	—	8½	8⅝	20	8⅞	8⅝	8⅝	—
5	8¾	8⅞	8½	8⅝	21	—	8⅝	8⅝	10⅛
6	8⅞	8⅞	8½	—	22	8¾	8⅝	8⅝	10¼
7	—	8⅞	8⅝	8½	23	8⅞	8⅝	—	—
8	8¾	8⅞	8½	8⅞	24	8⅞	8⅝	8⅝	—
9	8¾	8¾	—	9¼	25	8⅞	—	—	—
10	8¾	8¾	8½	9⅛	26	8⅞	8⅝	8⅝	—
11	8⅞	—	8½	9¼	27	8⅞	8⅝	8⅝	—
12	9	8½	8½	10⅜	28	—	8½	8¾	—
13	—	8¼	8½	—	29	8⅞	8½	8¾	—
14	—	8⅛	8½	10¼	30	8⅞	8½	—	—
15	9	8⅛	8½	10	31	8⅞	—	8⅝	—
16	8⅞	8⅛	—	10⅛					

Average Monthly Price Per Pound

Month	1926 Pence	1927 Pence	1928 Pence
Jan.	38.750	19.410	19.310
Feb.	30.460	19.021	15.713
Mar.	29.130	20.125	12.736
Apr.	24.260	19.897	8.864
May	22.520	19.769	8.845
June	20.423	17.880	9.293
July	20.293	16.770	9.312

Month	1926 Pence	1927 Pence	1928 Pence
Aug.	19.465	17.202	9.300
Sept.	20.197	16.293	8.530
Oct.	20.909	16.366	8.807
Nov.	19.818	18.159	8.596
Dec.	18.516	19.690	8.570
Average for Year	23.750	18.375	

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Day of Month	Dec.	Jan.	Day of Month	Dec.	Jan.	Day of Month	Dec.	Jan.
1	20.40	——	11	20.55	20.25	21	20.40	20.40
2	——	20.10	12	20.50	20.35	22	20.50	20.40
3	20.45	20.25	13	20.60	——	23	——	——
4	20.45	20.00	14	20.55	20.55	24	20.55	——
5	20.55	20.00	15	20.35	20.25	25	——	——
6	20.35	——	16	——	20.55	26	20.50	——
7	20.40	19.95	17	20.50	20.35	27	20.30	——
8	20.00	20.00	18	20.55	20.40	28	20.55	——
9	——	20.25	19	20.55	20.40	29	20.55	——
10	20.00	20.20	20	20.50	——	30	——	——
						31	20.55	——

Average Monthly Price Per Pound

Month	1926 Cents	1927 Cents	1928 Cents
Jan.	20.85	13.42	19.12
Feb.	20.60	14.10	18.40
Mar.	19.35	14.32	19.38
Apr.	19.13	14.75	20.63
May	18.92	16.07	21.58
June	18.57	16.85	21.50
July	18.71	18.00	21.36

Month	1926 Cents	1927 Cents	1928 Cents
Aug.	18.57	20.04	19.28
Sept.	17.02	21.95	18.67
Oct.	12.86	20.22	19.62
Nov.	12.86	20.22	19.84
Dec.	12.68	19.58	20.22
Average for Year	17.53	17.49	19.97

Stock of Crude Rubber in the U. S.

(All Quantities in Long Tons)

At	ON HAND			AFLOAT			ON HAND AND AFLOAT		
End of	1926	1927	1928	1926	1927	1928	1926	1927	1928
Jan.	55,198	76,172	110,244	46,296	45,312	41,256	100,434	121,484	151,500
Feb.	58,035	91,186	108,955	46,935	42,166	43,316	104,970	133,352	152,271
March	61,822	85,740	114,061	43,567	49,600	39,324	105,389	135,340	153,385
April	55,261	92,757	113,083	41,905	38,963	33,986	97,166	131,720	147,069
May	64,360	94,563	105,356	40,303	44,181	34,374	104,663	138,744	139,730
June	60,460	89,250	90,198	40,907	47,233	40,001	101,367	136,483	130,119
July	64,900	98,469	83,242	38,062	40,587	42,304	102,962	139,056	125,546
Aug.	60,870	96,148	68,994	37,360	40,937	51,875	98,230	137,085	120,869
Sept.	62,078	97,829	68,851	42,464	37,966	48,566	105,542	135,793	117,417
Oct.	64,089	97,452	66,421	52,930	42,804	41,571	117,919	140,256	107,992
Nov.	69,385	101,034	61,956	47,311	37,076	68,119	116,696	138,110	130,075
Dec.	72,520	100,130	66,166	52,020	47,938	68,764	124,540	148,068	134,930

(Rubber Association of America figures raised to 100%.)

Stock of Crude Rubber in London

(No. of tons in Wharves and Warehouses, including Latex)

At end of:	1920	1921	1922	1923	1924	1925	1926	1927	1928
Jan.	19,300	56,573	67,252	73,498	57,460	27,172	9,994	54,994	66,524
Feb.	18,329	59,439	67,623	70,483	56,732	23,425	10,004	58,826	62,964
Mar.	18,969	63,913	66,670	63,438	55,647	18,104	13,127	63,055	58,272
Apr.	20,072	68,759	68,637	58,770	54,559	12,949	18,773	66,897	53,425
May	20,921	70,403	70,146	54,439	51,615	5,895	20,384	67,169	44,628
June	22,517	69,408	71,597	51,050	51,115	5,318	23,984	63,902	38,756
July	25,346	71,065	71,515	49,937	52,073	4,258	27,727	63,717	35,429
Aug.	30,674	73,211	72,112	58,427	49,700	4,619	30,165	64,491	32,084
Sept.	35,504	72,175	70,977	54,523	44,011	5,453	35,077	68,236	31,440
Oct.	41,743	69,229	68,536	58,891	37,523	5,086	42,138	69,569	24,207
Nov.	45,550	70,786	68,548	60,074	33,593	3,869	44,057	67,050	17,775
Dec.	50,652	69,792	72,299	60,246	29,488	5,697	48,918	63,793	

At End of Recent Weeks

	First Saturday	Second Saturday	Third Saturday	Fourth Saturday	Fifth Saturday
1928					
January	64,360	65,524	65,450	66,285	———
February	65,909	64,945	63,769	63,103	———
March	61,978	61,920	61,033	59,644	58,197
April	58,732	58,945	56,819	53,360	———
May	52,015	50,837	48,705	44,628	———
June	43,716	42,683	41,185	40,083	38,611
July	36,915	35,925	35,238	35,445	———
August	34,294	33,649	32,591	32,815	———
September	31,933	31,477	32,110	31,884	31,462
October	29,525	27,370	26,477	24,240	———
November	22,919	21,494	20,194	18,724	———
December	16,855	16,517	17,669	18,821	19,727
1929					
January	21,953	23,016	23,547		

Rubber in Singapore and Penang

(Stocks held by Dealers—Quantities in Long Tons)

End of	1926	1927	1928	End of	1926	1927	1928
Jan.	16,726	25,440	25,868	July	23,101	22,558	18,663
Feb.	13,653	26,766	22,867	Aug.	23,362	25,764	18,971
Mar.	18,389	27,844	20,538	Sept.	25,997	25,178	14,898
Apr.	16,328	24,543	16,946	Oct.	26,614	25,790	12,149
May	16,967	25,133	17,437	Nov.	25,486	28,369	29,188
June	19,416	21,898	18,207	Dec.	26,443	25,798	32,895

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total	Per Cent Balloons		Total	Per Cent Balloons
1922	16,297,735	0.0	1925	26,001,664	66.8
1923	28,140,620	0.6	1926	24,199,524	78.8
1924	21,863,311	19.7	1927	19,700,003	79.1
1928					
January	1,811,534	87.8	July	2,209,692	85.9
February	1,806,437	86.5	August	2,318,898	80.2
March	2,420,084	86.4	September	2,315,604	76.9
April	2,316,324	88.4	October	2,114,611	72.2
May	2,185,592	84.0	November	1,213,245	66.4
June	2,429,453	83.1	December	1,101,193	74.7

U. S. Consumption of Gasoline

(In Barrels of 42 Gallons)

MONTHS	1924	1925	1926	1927	1928
January	11,918,000	14,386,000	17,582,000	17,888,000	20,939,000
February	9,626,000	13,210,000	15,814,000	18,240,000	21,136,000
March	10,961,000	14,890,000	19,302,000	22,464,000	24,041,000
April	14,583,000	19,013,000	20,848,000	23,371,000	25,712,000
May	15,889,000	20,459,000	24,213,000	26,579,000	27,355,000
June	16,421,000	20,724,000	23,803,000	27,799,000	29,022,000
July	18,610,000	22,879,000	24,752,000	29,784,000	30,960,000
August	19,825,000	22,323,000	26,912,000	29,779,000	33,148,000
September	16,871,000	20,177,000	22,929,000	28,409,000	29,691,000
October	18,029,000	19,826,000	23,973,000	25,497,000	30,610,000
November	16,607,000	18,024,000	20,618,000	24,400,000	26,222,000
December	15,663,000	17,954,000	21,419,000	23,718,000	
TOTAL	185,003,000	223,865,000	262,165,000	297,928,000	

U. S. Tire and Tube Statistics

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Figures for Recent Years

	1922	1923	1924	1925	1926	1927
Production	40,932	45,259	51,633	60,845	61,237	64,439
Shipments	39,987	45,204	50,120	59,262	59,002	64,059
Inventory[2]	6,132	5,772	7,427	8,142	10,456	10,264

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1926	1927	1928	1926	1927	1928	1926	1927	1928
Jan.	4,587	4,965	5,491	2,974	4,932	5,394	9,947	10,432	9,949
Feb.	4,865	5,095	6,363	3,486	4,458	5,031	11,164	11,075	11,721
Mar.	5,456	6,276	6,819	4,561	5,701	5,731	12,004	11,583	12,389
Apr.	5,346	6,209	6,178	4,980	5,701	5,812	12,461	12,122	12,717
May	5,023	6,151	6,759	5,211	5,657	6,457	12,343	12,462	13,024
June	5,422	6,202	6,692	5,724	6,253	7,117	11,968	12,462	12,162
July	4,950	5,087	6,498	6,337	5,973	7,895	10,592	11,326	11,157
Aug.	5,872	5,752	7,469	6,744	6,393	8,403	9,732	10,721	10,034
Sept.	5,706	4,822	6,802	6,040	5,717	7,145	9,318	9,722	9,765
Oct.	5,103	4,773	7,326	4,544	4,799	5,717	9,917	9,665	11,520
Nov.	4,324	4,502	6,075	3,733	4,306	4,998	10,297	10,136	12,579
Dec.	4,683	4,497		4,718	4,165		10,456	10,264	

AUTOMOBILE INNER TUBES

Figures for Recent Years

	1922	1923	1924	1925	1926	1927
Production	50,850	60,116	70,706	82,614	76,618	70,823
Shipments	49,673	59,072	68,016	81,004	71,591	72,896
Inventory[2]	7,643	8,425	11,052	11,313	16,200	13,692

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1926	1927	1928	1926	1927	1928	1926	1927	1928
Jan.	6,809	5,337	5,441	3,723	6,016	6,072	14,361	15,585	12,982
Feb.	6,825	5,658	6,895	3,736	5,120	5,431	17,090	16,075	14,650
Mar.	7,030	7,184	6,231	4,987	6,157	5,731	19,131	17,096	15,573
	6,554	7,373	6,661	5,051	6,359	5,702	20,674	17,801	16,638
May	6,149	6,737	7,168	6,304	6,140	6,300	21,141	18,389	17,702
June	6,171	6,306	6,953	6,898	6,832	7,136	20,243	17,858	17,159
July	5,729	5,284	6,674	8,569	7,070	8,729	17,267	16,004	14,974
Aug.	7,424	6,480	8,343	9,579	7,983	9,350	15,462	14,664	13,931
Sept.	7,590	5,651	7,103	7,762	6,758	7,154	15,312	13,511	13,543
Oct.	6,208	5,065	6,929	5,474	5,024	5,662	15,929	13,539	15,285
Nov.	4,852	4,775	5,592	4,045	4,723	5,002	16,604	13,585	15,743
Dec.	5,277	4,969		5,463	4,712		16,200	13,692	

(1) Rubber Association of America figures, raised to 100%. The Association estimates its figures to be 75% representative or complete when issued and that basis has been accepted when preparing the statistics in this table.

(2) Held by manufacturers at end of period indicated.

Automobile Production

	United States			Canada			
	Total	Passenger Cars	Trucks	Total	Passenger Cars	Trucks	Grand Total
1922	2,547,208	2,302,923	244,285	102,053	94,904	7,149	2,649,261
1923	4,020,255	3,631,728	388,527	146,438	129,228	17,210	4,166,693
1924	3,600,918	3,203,049	397,869	135,246	117,765	17,481	3,736,164
1925	4,265,704	3,760,459	505,245	161,389	139,311	22,078	4,427,093
1926	4,298,799	3,808,753	490,046	205,092	164,483	40,609	4,503,891
1927							
Jan.	238,926	199,650	39,276	15,376	11,745	3,631	254,302
Feb.	304,758	264,171	40,587	18,655	14,826	3,829	323,413
March	394,430	345,911	48,519	23,250	19,723	3,527	417,680
April	404,743	357,009	47,734	24,611	20,890	3,721	429,354
May	404,099	357,148	46,951	25,708	21,991	3,717	429,807
June	321,959	278,728	43,231	19,208	16,470	2,738	341,167
July	268,474	236,866	31,608	10,987	8,719	2,268	279,461
Aug.	308,807	274,378	34,429	12,526	10,139	2,387	321,333
Sept.	260,420	226,440	33,980	11,262	8,681	2,581	271,682
Oct.	219,712	183,041	36,671	7,791	6,236	1,555	227,503
Nov.	134,381	109,742	24,639	6,617	5,173	1,444	140,998
Dec.	133,178	105,784	27,394	3,435	2,277	1,158	136,613
TOTAL	3,393,887	2,938,868	453,019	179,426	146,870	32,556	3,573,313
1928							
Jan.	225,039	199,032	26,007	8,463	6,705	1,758	282,502
Feb.	323,368	290,830	32,358	12,504	10,315	2,189	335,872
March	412,825	371,408	41,417	9,724	7,478	2,246	422,549
April	409,948	364,877	45,071	24,240	20,546	3,694	434,188
May	425,990	375,798	50,192	33,942	29,764	4,178	459,932
June	396,967	356,439	40,528	28,399	25,341	3,058	425,366
July	390,445	237,933	52,512	25,226	20,122	5,104	415,671
Aug.	458,429	400,689	57,740	31,245	24,274	6,971	489,674
Sept.	413,722	358,872	54,850	21,193	16,572	4,621	434,915
Oct.	397,096	339,976	57,120	18,536	13,016	5,520	415,632
Nov.	256,936	217,256	39,680	11,769	8,154	3,615	268,705
Dec.	233,135	205,144	27,991	9,425	6,734	2,691	242,560
TOTAL	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA[1]							DUTCH EAST INDIES[2]						
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon[3]	India & Burma[4]	Sarawak[4]	British North Borneo[4]	Siam[4]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China[4]	Amazon Valley	All Other[4]	World Total[7]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,955
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	517,523
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1926:															
Oct.	39,367	15,203	24,164	5,672	634	805	473	385	4,058	6,998	11,491	661	1,904	1,023	58,268
Nov.	34,302	12,201	22,101	4,228	1,110	685	547	285	3,988	5,816	9,422	718	1,911	1,259	52,070
Dec.	36,811	14,716	22,095	6,498	1,176	895	617	338	5,054	7,117	12,786	790	3,821	714	61,901
1927:															
Jan.	34,946	14,995	19,951	6,697	921	959	585	304	4,187	6,706	10,690	941	3,482	981	56,404
Feb.	27,528	11,697	15,831	3,571	1,469	552	445	360	4,078	6,526	10,535	675	2,104	1,098	47,244
Mar.	41,346	17,464	23,882	7,142	1,124	997	639	432	5,657	7,004	12,905	733	3,178	1,791	65,484
Apr.	29,041	13,069	15,972	3,349	723	984	452	526	4,666	5,531	10,197	557	2,451	1,520	46,928
May	31,393	15,491	15,902	3,124	760	786	415	348	5,430	5,529	13,410	586	2,460	1,207	49,957
June	32,607	14,706	17,901	3,348	856	1,100	539	409	4,818	5,518	9,109	772	889	1,731	46,990
July	23,947	12,697	11,250	4,018	827	859	544	333	4,771	6,142	11,566	519	1,757	1,113	43,699
Aug.	30,371	17,105	13,266	5,357	688	1,133	623	546	4,355	6,682	12,440	716	1,928	969	48,708
Sept.	29,835	12,095	17,740	4,911	479	645	566	498	3,635	5,957	9,853	497	2,072	1,213	48,066
Oct.	29,846	15,801	14,045	5,245	802	721	591	542	3,810	7,755	13,633	775	2,752	939	51,520
Nov.	28,277	19,860	8,417	4,464	1,277	1,241	591	600	4,127	6,587	14,395	683	2,369	1,627	46,378
Dec.	32,185	17,865	14,320	4,130	1,395	946	592	664	5,763	7,878	13,438	1,191	3,340	1,444	55,101
1928:															
Jan.	27,789	16,618	11,171	3,830	1,605	842	581	525	4,851	7,988	11,360	1,100	2,273	1,025	47,151
Feb.	28,848	12,911	15,937	4,947	1,081	667	581	536	4,052	6,757	8,635	787	1,612	1,276	46,868
Mar.	27,879	10,508	17,371	3,683	775	645	581	269	3,999	5,826	9,690	700	2,750	1,211	47,500
Apr.	20,139	9,335	10,804	3,233	789	630	500*	258	3,993	5,040	5,538	736	1,014	1,323	33,858*
May	26,483	10,350	16,133	3,091	654	842	500*	241	4,943	5,355	10,382	717	2,062	1,135	46,055*
June	22,994	16,168	6,826	3,107	963	926	500*	451	5,419	5,863	13,623	725	1,399	960	40,762*
July	30,405	13,383	17,022	5,129	1,043	905	500*	366	5,602	7,566	11,424	744	1,264	873	52,438*
Aug.	35,593	15,114	20,479	5,720	398	1,227	500*	544	5,668	7,438	11,798	779	1,732	450	56,733*
Sept.	29,700	11,239	18,461	4,675	457	938	500*	447	4,956	6,536	9,791	1,112	1,614	494	49,981*
Oct.	24,441	12,603	11,838	3,999	864	949	500*	457	5,295	7,474	9,977	566	1,399	732	44,050*
Nov.	68,072	10,436	57,636	8,705	1,048	772	500*	425	4,950	7,902	7,805	943	1,790	596*	93,072*
Dec.	66,763	11,112	55,651	8,127		744	500	294				948			

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, and 2,439 in 1927. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments were equivalent to 18 tons in 1923, 93 tons 1924, 6 tons 1925, 20 tons in 1926, and about ½ ton in 1927. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I" are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons 1924, 2,239 tons 1925, 44 tons in 1926, and 84 tons in 1927. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands. This figure includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. *Figure is provisional; final figure will be shown immediately it becomes available.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States*	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (ed)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	236,977	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	342,378
1920	248,762	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	370,641
1921	179,678	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,562
1922	296,267	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	-3,807	1,778	589	567	395,885
1923	300,372	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	408,018
1924	317,747	-11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	-807	3,178	944	1,370	414,847
1925	381,815	4,061	32,956	35,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	516,493
1926	395,667	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	613,643
1926:															
September	35,675	8,843	1,774	2,029	1,355	1,922	819	472	1,241	283	429	317	91	138	55,388
October	28,110	8,082	3,376	2,423	1,865	2,896	645	585	1,004	301	2	360	100	121	49,370
November	37,673	9,247	2,719	3,007	1,548	3,380	832	568	916	194	-18	358	90	181	60,695
December	35,850	4,749	2,890	2,562	1,847	856	439	725	777	248	156	448	151	306	51,999
1927:															
January	41,815	10,192	3,284	2,481	1,936	1,227	672	803	929	296	192	316	139	100	64,382
February	25,886	7,692	3,263	3,103	2,620	1,902	601	907	460	502	152	336	146	210	47,780
March	32,752	9,049	2,050	3,475	3,760	1,578	852	784	780	454	86	385	137	127	56,269
April	44,627	7,875	2,310	2,393	1,509	2,181	781	1,972	762	448	58	230	177	218	65,541
May	33,736	2,896	2,006	3,380	2,519	1,084	918	887	694	626	-57	335	155	223	49,402
June	31,270	2,282	2,387	3,632	2,086	798	942	1,506	557	583	-17	243	164	183	46,616
July	35,719	1,116	2,384	2,899	2,104	1,505	1,007	415	900	429	66	227	177	236	49,184
August	31,001	3,463	2,795	3,119	2,013	1,970	1,274	386	650	604	-63	312	138	123	47,785
September	29,801	7,800	1,956	2,891	1,850	2,025	684	518	772	552	-33	451	155	272	49,694
October	27,671	5,888	3,479	4,202	1,790	1,966	1,021	1,075	908	465	156	401	153	363	49,538
November	36,123	1,687	3,661	4,209	1,916	1,575	1,167	1,312	836	749	298	474	246	317	54,570
December	28,082	309	4,696	3,108	2,202	2,710	1,462	1,453	1,242	784	-202	514	268	300	47,028
	398,483	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,492	636	4,224	2,055	2,672	627,786
1928:															
Jan.	37,110	1,921	1,764	3,485	2,290	1,361	760	755	802	589	52	261	335	376	50,870
Feb.	30,925	3,143	2,526	2,984	2,553	1,248	437	783	616	599	98	307	296	297	46,812
Mar.	36,893	3,179	1,902	3,521	2,989	1,694	763	231	918	816	95	351	497	398	54,254
April	35,663	—2,280	2,204	2,719	1,938	2,334	1,115	1,820	832	575	280	339	304	159	48,001
May	28,660	—5,823	3,210	2,944	2,180	2,288	1,095	3,893	655	746	209	485	220	213	41,469
June	25,144	—3,031	4,550	2,968	2,632	2,102	984	4,111	348	743	133	346	251	182	41,463
July	28,171	—1,374	2,652	3,387	2,692	2,026	1,599	724	591	895	395	294	175	384	42,609
Aug.	28,827	48	3,587	2,744	2,447	1,868	875	632	707	519	316	359	58	94	43,081
Sept.	36,797	4,199	3,524	3,553	2,810	1,837	1,278	20	603	597	345	377	277	235	56,452
Oct.	41,667	—934	3,728	4,386	2,943	3,711	1,049		776	696	141	527	250	318	
Nov.	33,836	—3,141		3,694	2,799		1,340			544	31				

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. *United States imports of guayule are not included in this compilation; such imports amounted to 4,305 tons in 1926; to 5,019 tons in 1927; and to 3,076 in the first eleven months of 1928.

BOOK REVIEWS

THE REALM OF RUBBER. By H. H. Ghosh. Published by J. B. Daymond, Calcutta. 1928. 270 pp.

As complete a compilation of all information pertaining to the cultivation of plantation rubber as has been published is contained in the pages of this exhaustive manual. The latest methods in bud grafting and seed selection, the diseases and pests of hevea, and the progress in rubber preparation are treated at length, and several chapters are devoted to the different countries in which rubber is produced. A final chapter on the statistics of the industry, taken from a publication of the British Rubber Growers' Association, is admittedly incomplete and not entirely accurate.

ENCYCLOPEDIE DU CAOUTCHOUC ET DES INDUSTRIES QUI S'Y RATTACHENT. Edited and published by the Revue Generale du Caoutchouc, Paris. 1929. 500 pp.

Intended to cover the entire field of rubber production and manufacture as concisely as possible, this volume does not fall far short of its goal. It is divided into four parts, the first of which discusses the production, preparation and transportation of crude rubber and latex. The second section deals with methods of vulcanization at full length, and the third and largest part treats in 21 separate articles of the various products made from rubber.

LOW TEMPERATURE CURED TIRES. Published by E. I. duPont de Nemours & Company, Inc., Wilmington, Del. 1928. 20 pp.

In this booklet, which is No. 7 in a series on the use of vulcanization accelerators, formulas and methods are given for achieving the best results through curing for short periods of time at low temperatures. It is pointed out that the time of vulcanization has quite as important a bearing on the quality of the product as the temperature.

United States Imports of Guayule Rubber and Related Gums

(All quantities in Long Tons)

	Guayule		Balata		Jelutong		Gutta Percha	
	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars
1919	1,430	760,690	727	937,038	8,332	2,213,964	2,900	1,068,698
1920	758	345,985	1,064	1,260,043	5,672	2,068,501	3,183	1,520,309
1921	58	26,945	814	1,077,859	1,745	351,893	985	333,564
1922	127	57,040	812	978,765	2,335	403,812	818	281,012
1923	1,155	542,227	700	898,524	4,565	853,308	912	375,167
1924	1,356	536,392	464	568,456	6,165	1,237,100	1,408	463,610
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	1,603	629,284
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	1,445	661,156
1927	5,018	2,674,957	582	447,246	7,785	2,448,657	1,494	728,172
1928:								
Jan.	432	242,339	27	24,218	588	183,705	150	86,702
Feb.	489	281,295	33	32,165	403	142,621	312	215,085
Mar.	575	365,927	32	26,460	829	388,616	115	57,833
Apr.	512	312,131	47	32,924	592	174,970	68	27,627
May	452	233,414	—	——	679	226,064	100	42,762
June	424	220,081	9	6,799	293	91,152	28	12,374
July	191	100,342	123	46,747	373	113,295	81	27,344
Aug.	—	——	399	165,460	451	126,962	147	60,738
Sept.	—	——	60	38,198	2,028	713,736	125	56,768
Oct.	—	——	121	59,358	429	129,065	239	94,570
Nov.	—	——	59	41,119	472	140,116	88	35,409

Reclaimed Rubber in the United States

(All Quantities in Long Tons—100% Basis)

Year	Production	Consumption Tons	Consumption % to Crude	Stocks*	Year	Production	Consumption Tons	Consumption % to Crude	Stocks*
1919	81,366	73,535	36.3	.....	1924	80,079	76,072	22.4	.....
1920	86,395	75,297	38.4	.....	1925	132,930	137,105	35.6	13,203
1921	36,725	41,351	24.1	.....	1926	180,582	164,500	45.9	23,218
1922	57,334	54,458	19.3	.....	1927	189,144	178,471	47.6	24,980
1923	74,766	69,534	22.7	.....					
1927:									
Jan.	16,526	12,374	39.3	25,903	July	15,488	13,842	47.4	26,599
Feb.	15,860	14,424	47.8	27,291	Aug.	15,109	15,836	47.3	25,157
Mar.	16,788	13,528	37.4	27,124	Sept.	14,392	14,790	54.3	23,429
Apr.	14,483	16,677	46.5	25,712	Oct.	16,127	17,292	64.5	22,176
May	16,159	15,754	46.1	26,419	Nov.	15,477	14,876	55.5	21,728
June	16,652	15,547	46.0	25,811	Dec.	16,083	13,431	52.7	24,980
1928:									
Jan.	14,862	18,134	52.7	21,941	July	17,278	17,173	45.9	17,305
Feb.	15,291	16,808	49.9	20,848	Aug.	19,049	15,532	36.2	15,881
Mar.	17,069	18,619	52.2	19,558	Sept.	18,693	16,022	40.2	17,991
Apr.	15,393	17 355	52.9	19,283	Oct.	17,182	16,587	41.7	17,026
May	18,945	18,201	48.8	18,137	Nov.	18,245	16,547	44.2	22,399
June	18,781	16,328	43.4	18 [illegible]	Dec.	17,728	12,894	41.3	24,785

*Stocks on hand at the end of month or year. Exports of reclaimed rubber, not shown in this table, amounted to 8,540 tons in 1927.

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